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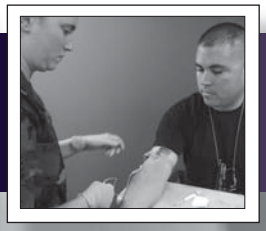

MEDICAL SURVEILLANCE MONTHLY REPORT

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Korea-acquired Malaria, U.S. Armed Forces, January 1998-October 2007

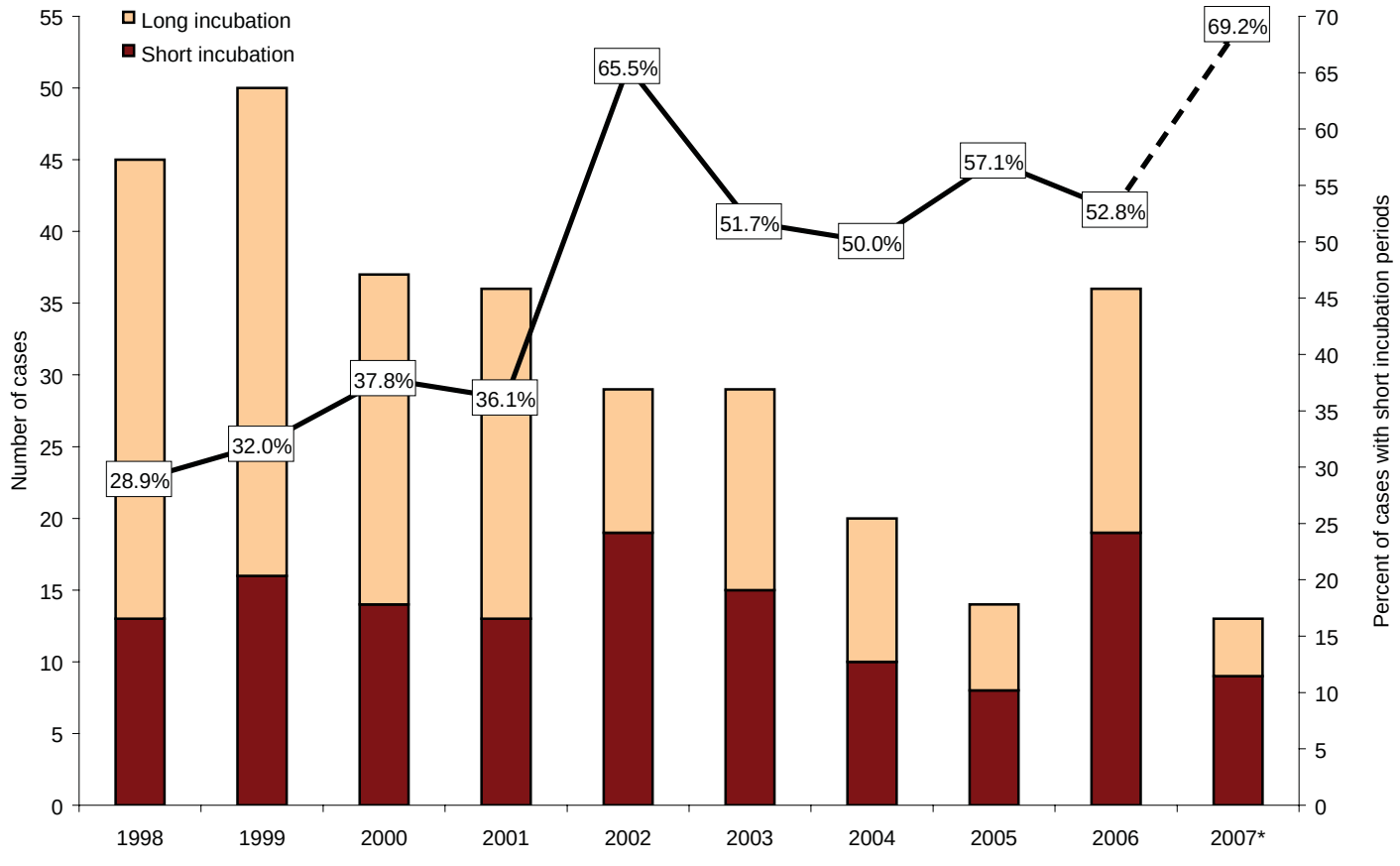
Malaria is a mosquito-transmitted parasitic disease that is caused by protozoa of the genus *Plasmodium*. Malaria is a leading cause of morbidity and deaths, particularly in tropical and sub-tropical regions. Historically, malaria has had significant impacts on military operations in malaria endemic areas.

Malaria parasites are transmitted by female *Anopheles* mosquitoes. In humans, disease is caused by four *Plasmodium* species: *P. falciparum*, *P. malariae*, *P. ovale*, and *P. vivax*. *P. vivax* causes the most cases, and *P. falciparum* causes the most (~90%) deaths.

In 1993, the Republic of Korea had been considered free of malaria for more than a decade.[1] However, during that year, malaria caused by *P. vivax* reemerged along the Demilitarized Zone (DMZ) that partitions the Korean peninsula.[2] Among South Koreans, vivax malaria rates increased rapidly from 1993 through 2000 and then declined.[3,4] Currently, the risk of acquisition of *P. vivax* is localized to areas adjacent to the DMZ and a few outlying areas.[5,6,7]

In general, when an infected Anopheline mosquito feeds on ("bites") a human, malaria parasites ("sporozoites") in the mosquito's saliva are injected into the skin, enter the bloodstream, and migrate to the liver. In the liver, the parasites differentiate ("merozoites"), multiply, and eventually enter the bloodstream where they infect red blood cells. In red blood cells, the parasites continue to multiply, infect other red blood cells, and may be ingested by female Anopheline mosquitoes. In temperate climates, *P. vivax* has adapted to the seasonality of Anopheline mosquitoes that are essential elements of the parasite's life cycle. Specifically, in temperate climates, some *P. vivax* sporozoites remain dormant in the liver ("hypnozoites") for months to years before they produce merozoites. Thus, hypnozoites enable *P. vivax* to survive through winter seasons when there are no mosquitoes. In Korea, for example, some *P. vivax* infections acquired in the summer and fall remain dormant as hypnozoites through the winter and reactivate during subsequent springs or summers when Anopheline mosquito populations are reestablished.[5]

Figure 1. Distribution of long and short incubation periods (estimated) of vivax malaria cases presumably acquired in Korea by U.S. military members, by estimated year of infection acquisition, 1998-2007 (through October)



* Through October

In general, in Korea, malaria cases with short incubation periods are clinically expressed one to four weeks after primary infections, while cases with long incubation periods are clinically expressed from 9 to 24 months after infections.[5,8] In recent years, long incubation cases have predominated among Republic of Korea soldiers who have been infected with *P. vivax* near the DMZ.[6,9]

U.S. service members are at risk of malaria exposure in Korea when they are stationed or train near the DMZ during the summer and fall.[7,10] Since typical assignments in Korea are 13 months in duration, most soldiers are potentially exposed to malaria risk for at least one full transmission season (possibly split over two calendar years). Since long incubation periods are likely to extend beyond a soldier's tour of duty in Korea, many Korea-acquired cases become clinically overt during subsequent assignments at locations outside of Korea.[10,11,12]

This report estimates frequencies, trends, and distributions of incubation periods of vivax malaria acquired in Korea by U.S. service members during the past 10 years.

Methods:

All data were derived from records routinely maintained in the Defense Medical Surveillance System (DMSS). The surveillance period was January 1998-October 2007. Records of active U.S. service members were searched for inpatient diagnoses (in any position) or reportable medical events of "vivax malaria" (ICD-9-CM: 084.1) or "unspecified malaria" (084.6). Only the first malaria episode per service member during the period was included.

For surveillance purposes, the "transmission season" for malaria in Korea was considered May through October. Malaria cases were presumed "Korea-acquired" if they were (1) diagnosed in or reported from Korea; or (2) diagnosed or reported within 2 years following either permanent assignment in Korea (per personnel records) or travel to Korea (per notation in a reportable medical event record). Service members who served in Afghanistan within the two years prior to diagnosis were assumed to have acquired malaria in Afghanistan. Service members with records of travel to other malarious areas or with Korea service dates that did not include any part of a transmission season were considered cases of "other/unknown origin."

All malaria cases that were hospitalized in or reported from Korea during a transmission season were considered "short incubation" cases. Cases hospitalized in/reported from locations outside of Korea were considered "long incubation" cases — except cases diagnosed within 4 weeks after leaving Korea during a transmission season. Cases hospitalized in/reported from locations outside of Korea were presumed to have been acquired during the year of the most recent transmission season spent in Korea.

Results:

Since 1998, 365 cases of *P. vivax* or unspecified malaria were reported among U.S. service members who served in or traveled to Korea **(Table 1).** All cases were among members of the U.S. Army. Twenty-six cases (7.1%) were considered likely to have been acquired in Afghanistan, and 30 cases (8.2%) were of "other/unknown" origin. The remaining 309 (84.7%) were considered Korea-acquired **(Figure 1).**

Presumed Korea-acquired cases peaked in 1999 (n=50), declined monotonically through 2005 (n=14), and then increased moderately in 2006 (n=36) **(Figure 1).** The majority (56%) of all Korea-acquired cases during the period were considered long incubation cases **(Table 1, Figure 1).**

During the period, the number of short incubation cases per year remained relatively stable **(Table 1, Figure 1).** However, there were significantly fewer long incubation cases per year after 2001 compared to before **(Table 1, Figure 1).** Specifically, from 1998 through 2001, approximately two-thirds of all Korea-acquired malaria cases had long incubation periods, while after 2001, the majority (57%) of cases had short incubation periods **(Table 1, Figure 1).** The proportions of cases with short and long incubation periods did not significantly vary in relation to age, race, or gender (data not shown).

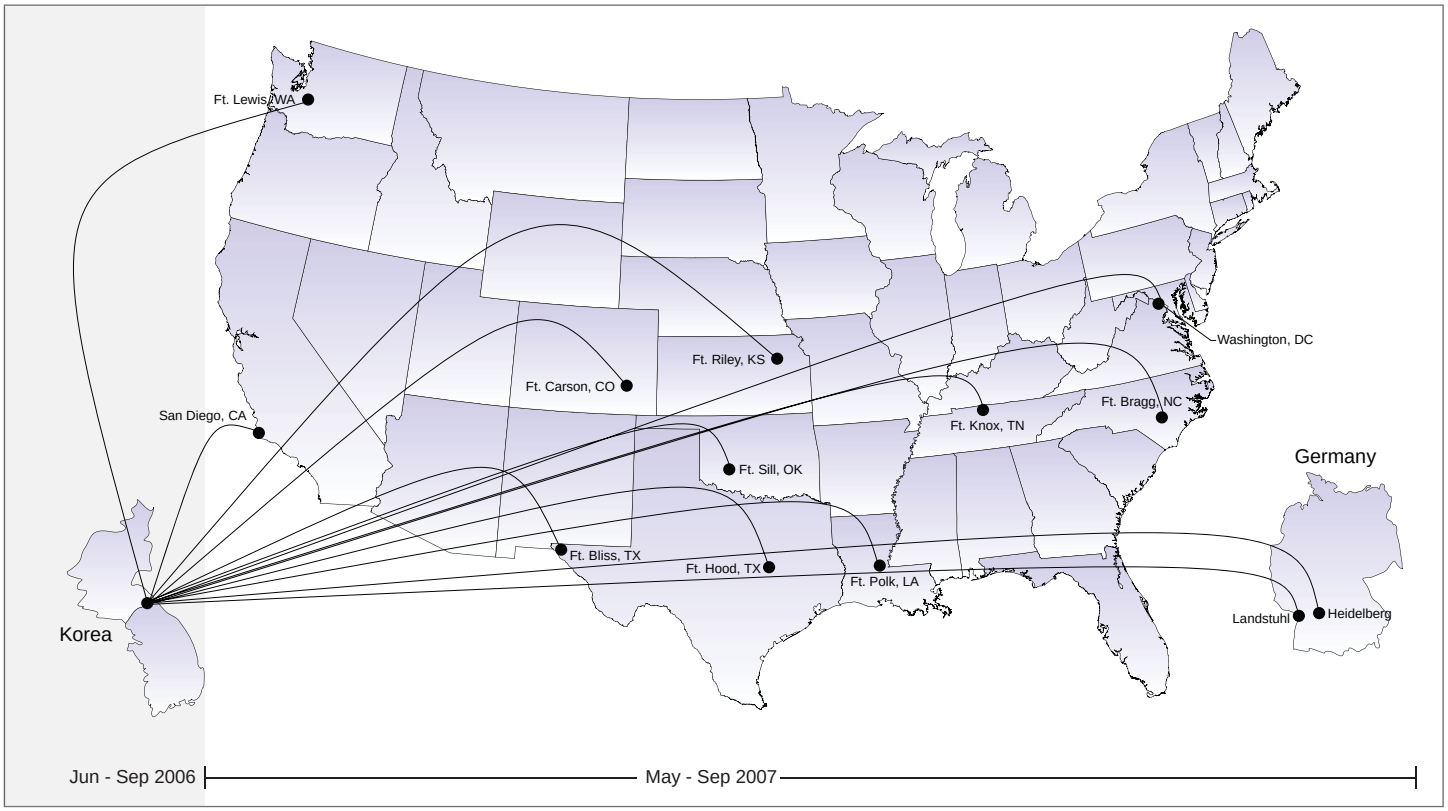
For surveillance purposes, service members who will return from Korea before May 2008 and subsequently will be diagnosed with vivax malaria will be presumed to have acquired malaria in Korea in 2007 (unless they traveled

Table 1. Number of vivax malaria cases presumably acquired in Korea, by year of infection acquisition (estimated) and length of incubation period, among U.S. military members, 1998-2007 (through October)

Year	Short incubation	Long incubation	Total
1998	13	32	45
1999	16	34	50
2000	14	23	37
2001	13	23	36
2002	19	10	29
2003	15	14	29
2004	10	10	20
2005	8	6	14
2006	19	17	36
2007*	9	4	13

*Through October

Figure 2. Geographic distribution of cases of *P. vivax* malaria of Korean origin (presumed), U.S. Army, 15 May - 30 September 2007



to other malarious areas). Thus, reports of vivax malaria that were presumably acquired in Korea during the 2007 transmission season are incomplete. However, if there are similar proportions of short and long incubation cases among those acquired in 2007 as those acquired during the previous 5 years (short: 55%; long: 45%), then an estimated 3 to 4 infections acquired during the past transmission season are currently dormant and will be clinically expressed after long incubation periods **(Table 1)**.

Locations of reported diagnoses: Between January and September 2007, 21 cases of Korea-acquired malaria were hospitalized in or reported from 13 fixed military medical facilities outside of Korea **(Figure 2)**. Four locations in the continental United States reported multiple cases — Fort Hood, TX (n=4), Fort Bragg, NC (n=4), Fort Bliss, TX (n=3), Washington, DC (n=2) — and 7 other locations (including 2 in Germany) reported one case each of Korea-acquired malaria **(Figure 2)**.

Editorial comment:

The findings of this report suggest that, during the past 10 years, more than half of all malaria infections acquired by U.S. soldiers in Korea had long incubation periods and were clinically expressed after the affected soldiers had departed Korea. From this experience, the number of *P. vivax* infections that are acquired each transmission season — and in turn, the number that may be dormant and likely will present at medical facilities outside of Korea — can be estimated from the number of short incubation cases that are diagnosed each season.

The finding has implications regarding surveillance, prevention, and clinical care. For example, during the recently completed 2007 transmission season, 9 *P. vivax* infections were presumably acquired in Korea and clinically expressed after short incubation times. If 55% of all infections acquired during the 2007 season were short incubation cases, then 7 infections would be expected to have long incubation periods. Because 4 long incubation cases have already been reported, it is estimated that approximately 3 infections acquired in Korea in 2007 will clinically present at unknown times and locations.

Among Korea-acquired cases since 2002, the number with long relative to short incubation periods has seemed to decline. However, since the beginning of the war on terrorism in the fall of 2001, many soldiers have deployed to Afghanistan or Iraq after assignments in Korea. Undoubtedly, some Korea-acquired *P. vivax* infections with long incubation periods were diagnosed and treated in deployed medical treatment facilities in Afghanistan or Iraq or during subsequent assignments. Such cases may not have been documented in records

routinely ascertained by the Defense Medical Surveillance System and/or may have been attributed to exposures in the Middle East rather than Korea. A recent report documented that nearly one-fourth (22%) of military members who were assigned in Korea and diagnosed with malaria between 2000 and 2005 had served in Afghanistan and/or Iraq after their Korea service and before their malaria diagnoses.[10] In 2004 alone, at least 6 soldiers who were diagnosed with malaria while deployed in Iraq had infections that were likely acquired during prior assignments in Korea.[13]

Although *P. vivax* infections are rarely fatal in otherwise healthy young adults, they can have significant medical and military operational impacts. For example, infected soldiers typically lose 3 to 4 days of duty after diagnosis, and full recovery often extends beyond one week.[13] In addition, delays in diagnosis and treatment can lead to prolonged disabling illnesses with increasingly severe acute exacerbations of signs, symptoms, and disability.

Before they are assigned to or travel in areas with malaria risk (e.g., Korea, Afghanistan), service members should be fully and specifically informed regarding the nature, timing, and distribution of the risk; the personal protective measures that are required to counter them; and the consequences of non-compliance (e.g., signs and symptoms of malaria potentially months to years after exposure). All individuals at risk should be issued the equipment (e.g., bed nets) and supplies (e.g., mosquito repellent) that are required to fully and effectively conduct all indicated personal protection measures. Primary health care providers should suspect malaria in U.S. service members (regardless of the location, local weather, or season) who present with unexplained acute febrile illnesses and served in Korea, Afghanistan or other malarious areas during the previous two years.

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Diagnoses of "Envenomations" in Relation to Diagnoses of Skin and Soft Tissue Infections due to Staphylococci/Penicillin Resistant Bacteria, U.S. Military Members, January 2002-October 2007

Skin and soft tissue infections, especially those caused by methicillin-resistant *Staphylococcus aureus (MRSA)*, are becoming more common in the United States.[1-3] In recent years, outbreaks of community acquired-MRSA (CA-MRSA) have been documented in U.S. military — particularly trainee — populations.[2,3]

At locations throughout the U.S., concerns about the misdiagnosis of CA-MRSA skin infections as "spider bites" have emerged.[4-9] In most reports of such cases, dermonecrotic lesions caused by CA-MRSA have been incorrectly attributed to envenomations by *Loxosceles reclusa*, the brown recluse spider.[4-9] In some cases, brown recluse spiders bites were diagnosed outside the known range or in much higher numbers than could reasonably be attributed to *L. reclusa* or other indigenous fauna.[6-8]

In the U.S. military, several investigations of reported outbreaks of "spider bites" have found no evidence of venomous spiders in barracks, sleeping bags, equipment, living environments, or training sites of affected units.[9] In at least one such case, cultures of skin lesions revealed methicillin-resistant *S. aureus* (MRSA).[10]

Because military populations are at high risk of CA-MRSA, and given the continuing spread of CA-MRSA throughout the U.S., it is important to detect and respond to localized outbreaks of CA-MRSA in timely and effective manners. If CA-MRSA lesions are frequently misdiagnosed, the treatment of infections with and responses to outbreaks of CA-MRSA may be delayed.

For this report, insights into the likelihood of misdiagnosing CA-MRSA as spider bites or other envenomations were sought by examining frequencies and trends of diagnoses of "envenomations" in military populations outside the range of the brown recluse spider.[11] Specifically, since 2002, frequencies and trends of diagnoses of "toxic effects of venom" and of invasive skin and soft tissue infections due to staphylococcus and/or microorganisms resistant to penicillins (SSTI-S/pcnR) were documented at recruit training and other U.S. military installations and among installations within, near to, and outside the known range of *L. reclusa* in the continental United States.[11]

Methods:

The surveillance period was 1 January 2002 to 31 October 2007. The surveillance population included all individuals who served in any Service of the U.S. military (active or reserve component) any time during the surveillance period.

For surveillance purposes, a clinical diagnosis of "envenomation" was defined by a medical encounter with a diagnosis in any position of ICD-9-CM: 989.5 "toxic effect of venom" and/or ICD-9-CM: E905.1 "venomous spiders — as the cause of poisoning and toxic reaction." A clinical diagnosis of skin or soft tissue infection, potentially due to MRSA ("SSTI-S/pcnR") was defined by a medical encounter with a diagnosis in any position of ICD-9-CM: 680 "carbuncle and furuncle" and/or ICD-9-CM: 681 "cellulitis and abscess of finger and toe" and/or ICD-9-CM: 682 "other cellulitis and abscess"; plus a diagnosis in any position of ICD-9-CM: 041.1 "staphylococcal infection in condition classified elsewhere" and/or ICD-9-CM: V09.0 "infection with microorganisms resistant to penicillins — including methicillin-resistant staphylococcus aureus (MRSA)." Only one episode of each clinical endpoint per individual per calendar year was used for analyses.

The locations of reported envenomations were estimated from locations of medical treatment facilities where relevant diagnoses were made. If the locations of treatment facilities could not be discerned from clinical records (e.g., care outside of military medical facilities), envenomations were assumed to occur at the assignment locations of affected subjects. Frequencies of incident diagnoses of each clinical endpoint during each calendar year were summarized separately for recruit and non-recruit installations and by whether installations were within, adjacent to, or outside the known range of *L. reclusa* ("brown recluse spider").[11] For this analysis, installations in Alabama, Arkansas, Illinois, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Oklahoma, Tennessee, and Texas were considered "within" the range of the brown recluse spider; installations in Florida, Georgia, Indiana, Iowa, Nebraska, New Mexico, North Carolina, Ohio, South Carolina, and West Virginia were considered "borderline"; all others were considered "outside" the range.[10] Cases with missing data elements were excluded from summaries based on those elements.

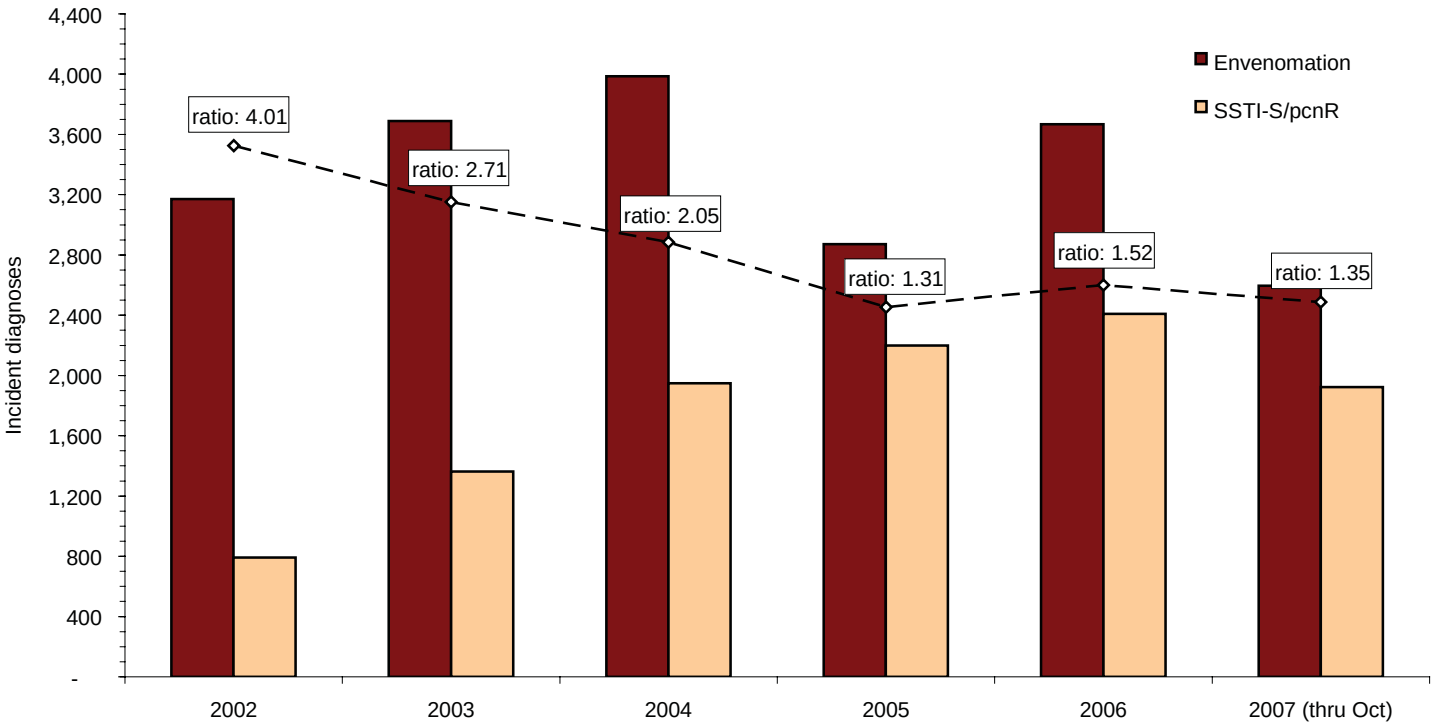
Results:

During the surveillance period, there were 19,983 and 10,636 incident per year episodes of envenomations and skin/soft tissue infections due to staphylococci and/or bacteria resistant to penicillins (SSTI-S/pcnR), respectively **(Table 1)**. Relatively few service members (n=337) were diagnosed with both envenomations and SSTI-S/pcnRs in the same calendar year **(Table 1)**.

Table 1. Incident diagnoses per calendar year of envenomations and/or skin/soft tissue infections due to staphylococci/bacteria resistant to penicillins (SSTI-S/pcnR), by characteristics of military installations, U.S. Armed Forces, January 2002 - October 2007

		2002		2003		2004		2005		2006		2007		Total	
Overall		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
	Envenomation only	3,132	79.8	3,626	72.7	3,910	66.7	2,810	56.1	3,604	59.9	2,564	57.2	19,646	64.9
	Skin/soft tissue infection only	752	19.2	1,300	26.1	1,872	32.0	2,138	42.7	2,347	39.0	1,890	42.1	10,299	34.0
	Envenom and skin/soft tissue	40	1.0	63	1.3	77	1.3	62	1.2	63	1.0	32	0.7	337	1.1
Recruit camp															
Yes	Envenomation only	604	77.8	604	66.5	663	64.2	497	54.9	593	60.6	422	52.4	3,383	62.6
	Skin/soft tissue infection only	163	21.0	283	31.2	356	34.5	390	43.0	376	38.4	383	47.5	1,951	36.1
	Envenom and skin/soft tissue	9	1.2	21	2.3	14	1.4	19	2.1	10	1.0	1	0.1	74	1.4
No	Envenomation only	2,191	79.6	2,620	72.2	2,856	65.9	2,054	54.4	2,159	55.5	1,389	52.7	13,269	63.1
	Skin/soft tissue infection only	534	19.4	972	26.8	1,424	32.9	1,682	44.5	1,691	43.5	1,226	46.5	7,529	35.8
	Envenom and skin/soft tissue	27	1.0	38	1.0	54	1.2	40	1.1	39	1.0	23	0.9	221	1.1
Recluse spider range															
In	Envenomation only	1,033	87.1	1,128	81.0	1,375	75.3	918	62.7	962	62.4	691	56.8	6,107	70.8
	Skin/soft tissue infection only	145	12.2	242	17.4	423	23.2	519	35.4	562	36.4	517	42.5	2,408	27.9
	Envenom and skin/soft tissue	8	0.7	23	1.7	28	1.5	28	1.9	18	1.2	8	0.7	113	1.3
Borderline	Envenomation only	893	75.3	1,003	64.5	958	57.3	577	43.4	912	58.4	593	54.4	4,936	58.8
	Skin/soft tissue infection only	274	23.1	530	34.1	689	41.2	735	55.3	630	40.4	491	45.0	3,349	39.9
	Envenom and skin/soft tissue	19	1.6	23	1.5	26	1.6	18	1.4	19	1.2	6	0.6	111	1.3
Out	Envenomation only	869	76.8	1,063	70.4	1,009	62.7	864	56.0	1,127	56.3	849	55.2	5,781	61.9
	Skin/soft tissue infection only	254	22.5	437	28.9	587	36.5	672	43.5	860	43.0	676	44.0	3,486	37.3
	Envenom and skin/soft tissue	8	0.7	11	0.7	13	0.8	8	0.5	15	0.7	13	0.8	68	0.7

Figure 1. Incident diagnoses per calendar year of envenomations and/or skin/soft tissue infections due to staphylococci/bacteria resistant to penicillins (SSTI-S/pcnR), U.S. Armed Forces, January 2002 - October 2007



Overall, the ratio of incident diagnoses of envenomations to incident diagnoses of SSTI-S/pcnRs sharply decreased during the period **(Figure 1).** For example, there were 4-times more diagnoses of envenomations than SSTI-S/pcnRs in 2002 but only approximately one-third more from 2005 to October 2007 **(Table 1).** The decline in the ratio of envenomations to SSTI-S/pcnRs was mostly attributable to steadily increasing diagnoses of SSTI-S/pcnRs (diagnoses of envenomations remained relatively stable throughout the period) **(Table 1, Figure 1).**

At both recruit training and other installations, there were approximately 75% more incident diagnoses of envenomations than SSTI-S/pcnRs overall **(Table 1).** At both types of installations, diagnoses of envenomations remained relatively stable while diagnoses of SSTI-S/pcnRs more than doubled — in turn, ratios of diagnoses of envenomations SSTI-S/pcnRs sharply declined during the period **(Table 1).**

Relationships between diagnoses of envenomations and SSTI-S/pcnRs varied across installations in relation to their proximity to the known range of the brown recluse spider. For example, at installations within the range of *L. reclusa*, there were 2.5-times more diagnoses of envenomations than SSTI-S/pcnRs overall, and the ratio of diagnoses of envenomations to SSTI-S/pcnRs declined very sharply from the beginning (2002, ratio: 6.80) to the end (2007, ratio: 1.33) of the period **(Table 1, Figure 2a).** In contrast, at installations on the border of or outside the range of *L. reclusa*, there were approximately one-half to two-thirds more diagnoses of envenomations than SSTI-S/pcnRs overall **(Table 1).** While the ratio of diagnoses of envenomations to SSTI-S/pcnRs declined during the period, the magnitudes of the declines were not nearly as great as at installations within the range of *L. reclusa* **(Table 1, Figures 2b,c).**

In each region relative to the range of *L. reclusa*, annual diagnoses of envenomations remained fairly stable while diagnoses of SSTI-S/pcnRs increased during the period **(Table 1, Figures 3).** Thus, in all regions, the declines in the ratios of diagnoses of envenomations to SSTI-S/pcnRs were entirely attributable to increases in diagnoses of SSTI-S/pcnRs **(Table 1, Figures 3).**

Editorial comment:

This report documents that during the past six years, more U.S. service members were diagnosed with "envenomations" than skin and soft tissue infections caused by *S. aureus* and/or penicillin resistant bacteria (SSTI-S/pcnR) — regardless of the locations of installations relative to the range of the brown recluse spider in the continental United States.

Not surprisingly, the relative excess of diagnoses of envenomations to diagnoses of SSTI-S/pcnRs was greatest at installations within the range of *L. reclusa*. Of note, however, during the period, installations in the range of *L. reclusa* had a slight decline in diagnoses of envenomations but a sharp increase — more than 4-fold — in diagnoses of SSTI-S/pcnRs. This suggests that clinical awareness of CA-

Figure 2a. Incident diagnoses per calendar year of envenomations and/or skin/soft tissue infections due to staphylococci/bacteria resistant to penicillins (SSTI-S/pcnR), by location in relation to known range of brown recluse spider, U.S. Armed Forces, January 2002 - October 2007

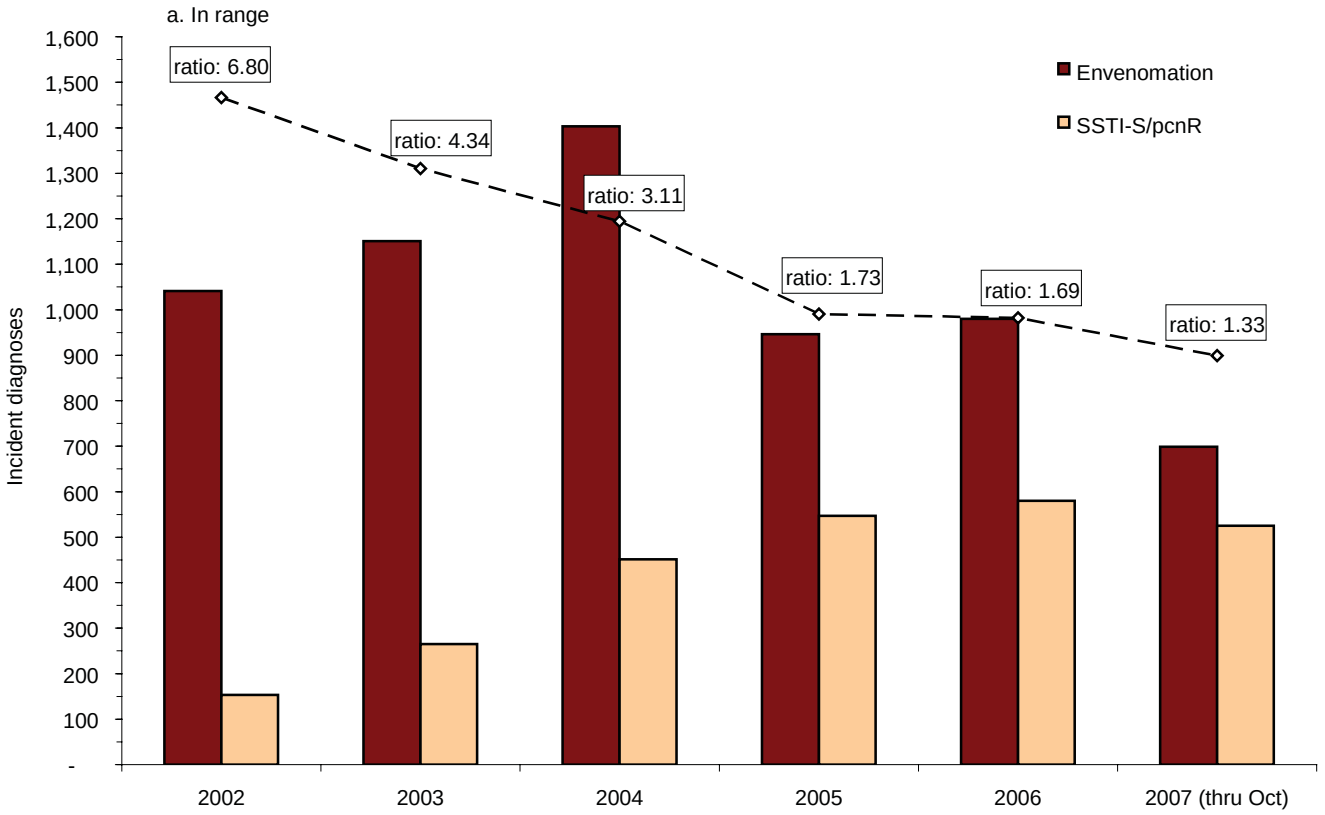


Figure 2b. Incident diagnoses per calendar year of envenomations and/or skin/soft tissue infections due to staphylococci/bacteria resistant to penicillins (SSTI-S/pcnR), by location in relation to known range of brown recluse spider, U.S. Armed Forces, January 2002 - October 2007

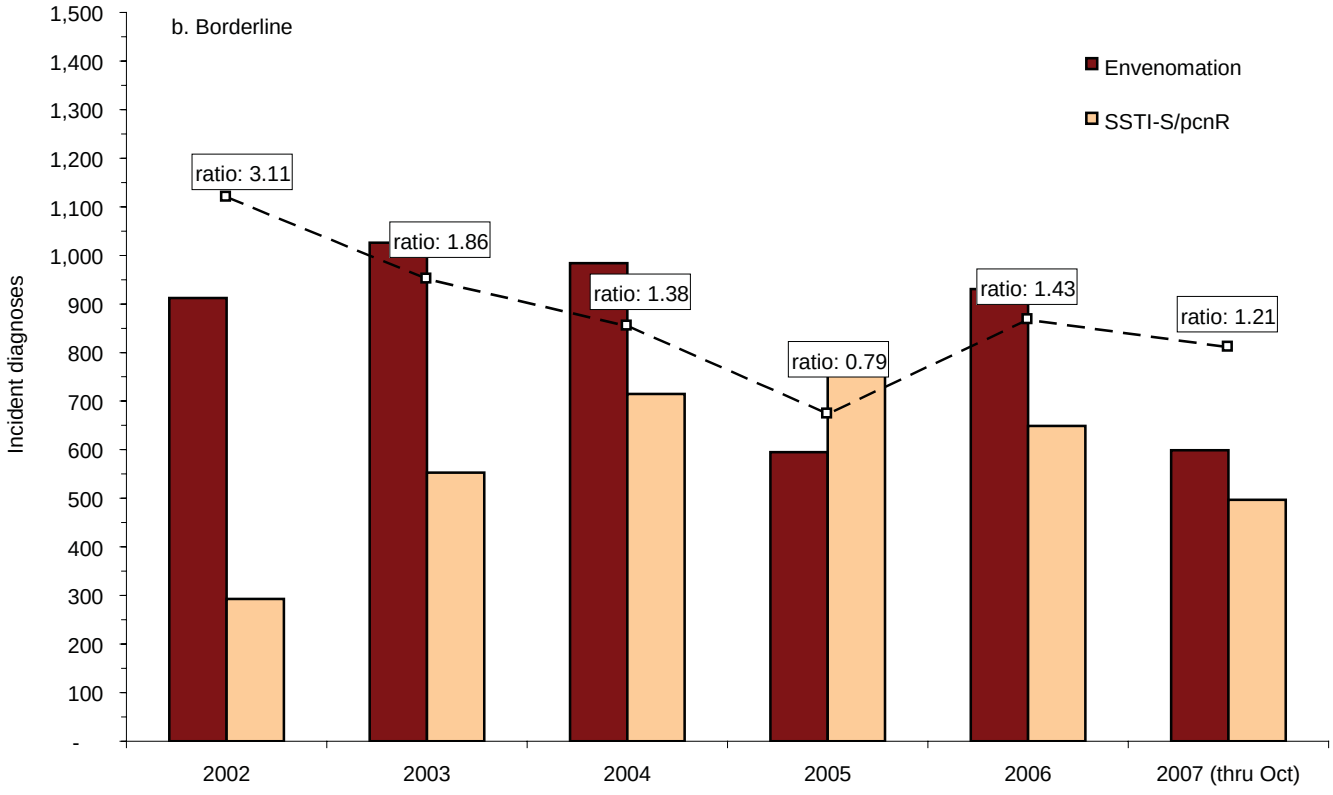


Figure 2c. Incident diagnoses per calendar year of envenomations and/or skin/soft tissue infections due to staphylococci/bacteria resistant to penicillins (SSTI-S/pcnR), by location in relation to known range of brown recluse spider, U.S. Armed Forces, January 2002 - October 2007

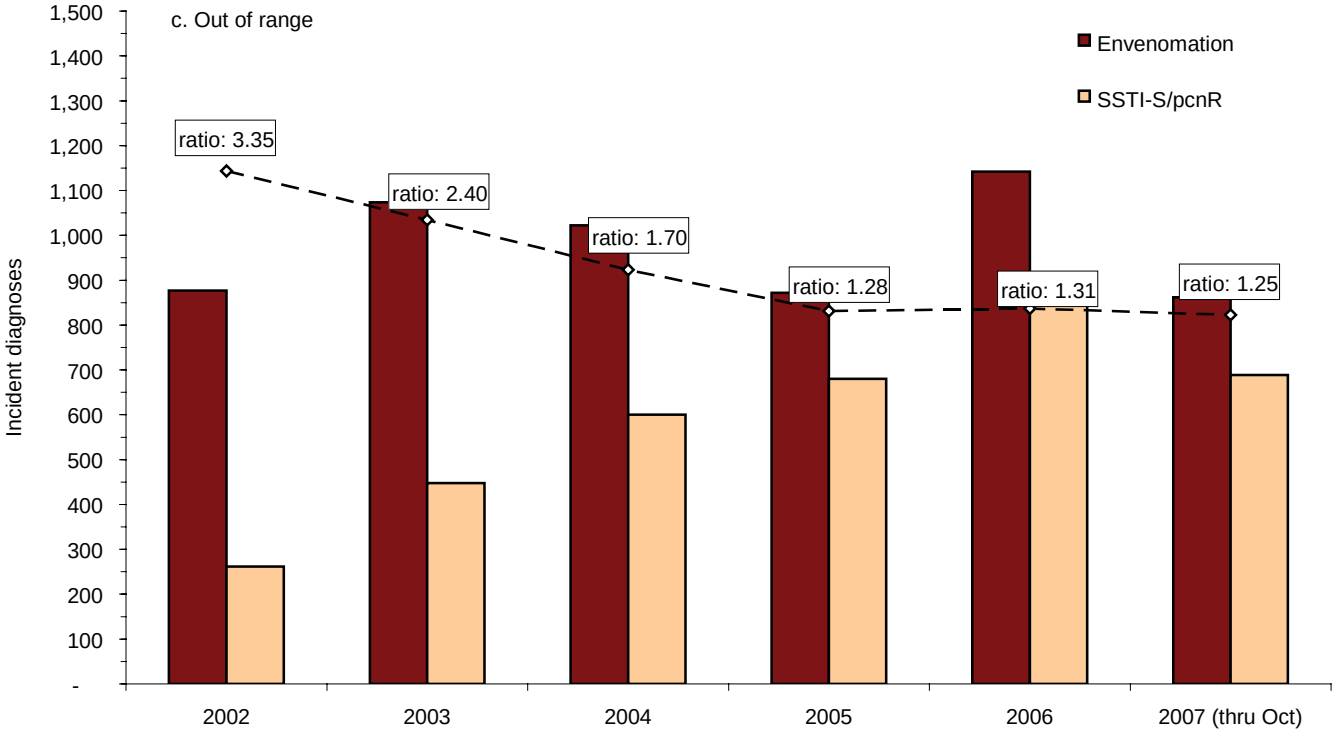
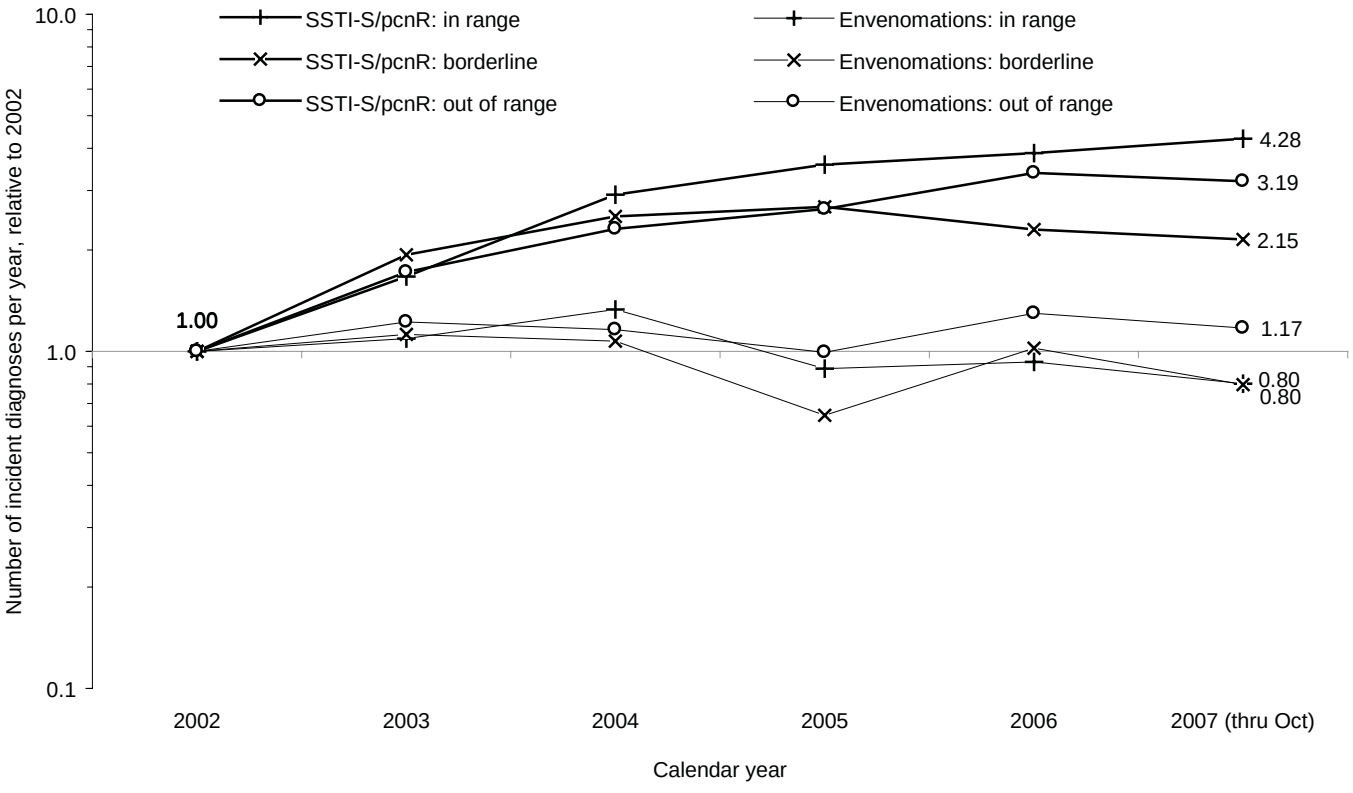


Figure 3. Trends of incident diagnoses, relative to 2002, of envenomations and skin/soft tissue infections due to staphylococci/bacteria resistant to penicillins (SSTI-S/pcnR), by locations of military installations relative to range of brown recluse spider, U.S. Armed Forces, January 2002 - October 2007



MRSA is relatively high at installations with relatively high risks of brown recluse spider bites — these installations have the greatest potential to confuse CA-MRSA skin infections with "envenomations."

Overall, relatively few service members received diagnoses of both "envenomation" and SSTI-S/pcnR in the same year. Thus, it seems relatively uncommon for skin lesions to be initially misdiagnosed as "spider bites" and eventually recognized as SSTI-S/pcnRs.

There are significant limitations that should be considered when interpreting the findings of this report. Most important, there are not diagnostic codes specific for the clinical endpoints of particular interest. Unfortunately, the diagnostic code that is used to report envenomations by brown recluse spiders is also used to report, for example, bites of venomous snakes, lizards, and other (e.g., widow) spiders; stings of bees, wasps, jellyfish, and red imported fire ants; and tick paralysis. Thus, diagnoses of "envenomations" at installations outside the range of the brown recluse spider likely reflect, to a great extent, "true" diagnoses of envenomations by other indigenous venomous fauna. As such, erroneous reports of SSTI-S/pcnRs as "spider bites" may be relatively few — and difficult to detect — against the background of more common envenomations from species other than spiders.

In addition, there are no ICD-9-CM codes specific for skin and soft tissue infections (SSTI) caused by MRSA. The combinations of codes used to ascertain MRSA-related SSTIs — "SSTI-S/pcnRs" for this report — are likely specific for identifying "true" MRSA cases; however, the sensitivity may be low in general and likely varied (e.g., due to increased awareness and/or clinical vigilance) over the period of the surveillance. As a result, reported frequencies likely underestimate actual numbers of MRSA-related SSTIs during the period; and reported trends likely reflect, to some extent, the effects of increasing clinical awareness and more complete reporting of MRSA-related SSTIs.

Finally, the specific locations and settings where "envenomations" occurred are not specifically documented. For most cases, the locations of the reporting medical treatment facilities were considered the sites of the presumed envenomations; however, for approximately 15% of cases, the affected individual's assignment location was considered the location of the envenomation. As a result, in some cases (e.g., during field training exercises, recreational activities, while on leave), the locations of envenomations in relation to the range of *L. reclusa* may have been misclassified.

As CA-MRSA infections and outbreaks become more frequent in military populations, primary care providers should become more suspicions of skin and soft tissue infections (e.g., abscesses) that may be MRSA-related. Specifically at installations where brown recluse spiders are a threat, it may be difficult to discern spider bites from MRSA-related skin lesions. Multiple lesions on the same individual and multiple cases in the same military unit, family, or other epidemiologically-related group are much more likely due to CA-MRSA than spider bites. However, regardless of the circumstances, bacterial cultures of suspicious lesions are warranted to ensure appropriate treatment of affected individuals and timely countermeasures in populations and settings where CA-MRSA may be spreading.

Data summaries by Pablo A. Aliaga, MS, Analysis Group, Army Medical Surveillance Activity.

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Update: Deployment Health Assessments, U.S. Armed Forces, January 2003-November 2007

The health protection strategy of the U.S. Armed Forces is designed to deploy healthy, fit, and medically ready forces, to minimize illnesses and injuries during deployments, and to evaluate and treat physical and psychological problems (and deployment-related health concerns) following deployment.

In 1998, the Department of Defense initiated health assessments of all deployers prior to and after serving in major operations outside of the United States.[1] In March 2005, the Post-Deployment Health Reassessment (PDHRA) program was begun to identify and respond to health concerns that persisted for or emerged within three to six months after return from deployment.[2]

This report summarizes responses to selected questions on deployment health assessments completed since 2003. In addition, it documents the natures and frequencies of changes in responses from before to after deployments.

Methods:

Completed deployment health assessment forms are transmitted to the Armed Forces Health Surveillance Center (Provisional)(AFHSC(P)) where they are incorporated into the Defense Medical Surveillance System (DMSS).[3] In the DMSS, data recorded on health assessment forms are integrated with data that document demographic and military characteristics and medical encounters (e.g., hospitalizations, ambulatory visits) at fixed military and other (contracted care) medical facilities of the Military Health System. For this analysis, DMSS was searched to identify all pre (DD2795) and post (DD2796) deployment health assessment forms completed since 1 January 2003 and all post-deployment health reassessment (DD2900) forms completed since 1 August 2005.

Results:

Since January 2003, 1,865,357 pre-deployment health assessment forms, 1,865,452 post-deployment health assessment forms, and 461,521 post-deployment health reassessment forms were completed at field sites, transmitted to the AFHSC(P), and integrated into the DMSS **(Figure 1)**. Throughout the period, there were intervals of approximately 2-4 months between peaks of pre-deployment and post-deployment health assessments (that were completed by different cohorts of deployers) **(Figure 1)**. Post-deployment health reassessments rapidly increased between February and May 2006 **(Figure 1)**. Since then, numbers of reassessment forms per month have been relatively stable (reassessment forms per month, December 2006-November 2007: mean: 23,258; range: 15,000-36,321) **(Figure 1, Table 1)**.

Between December 2006 and November 2007, nearly three-fourths (73.6%) of deployers rated their "health in general" as "excellent" or "very good" during pre-deployment health assessments **(Figure 2)**. During the same period, only 60.2% and 52.2% of redeployers rated their general health as "excellent" or "very good" during post-deployment assessments and post-deployment reassessments, respectively **(Figure 2)**.

From pre-deployment to post-deployment to post-deployment reassessments, there were sharp increases in the proportions of deployers who rated their health as "fair" or "poor" **(Figure 2)**. For example, prior to deployment, approximately one of 40 (2.7%)

Figure 1. Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-November 2007

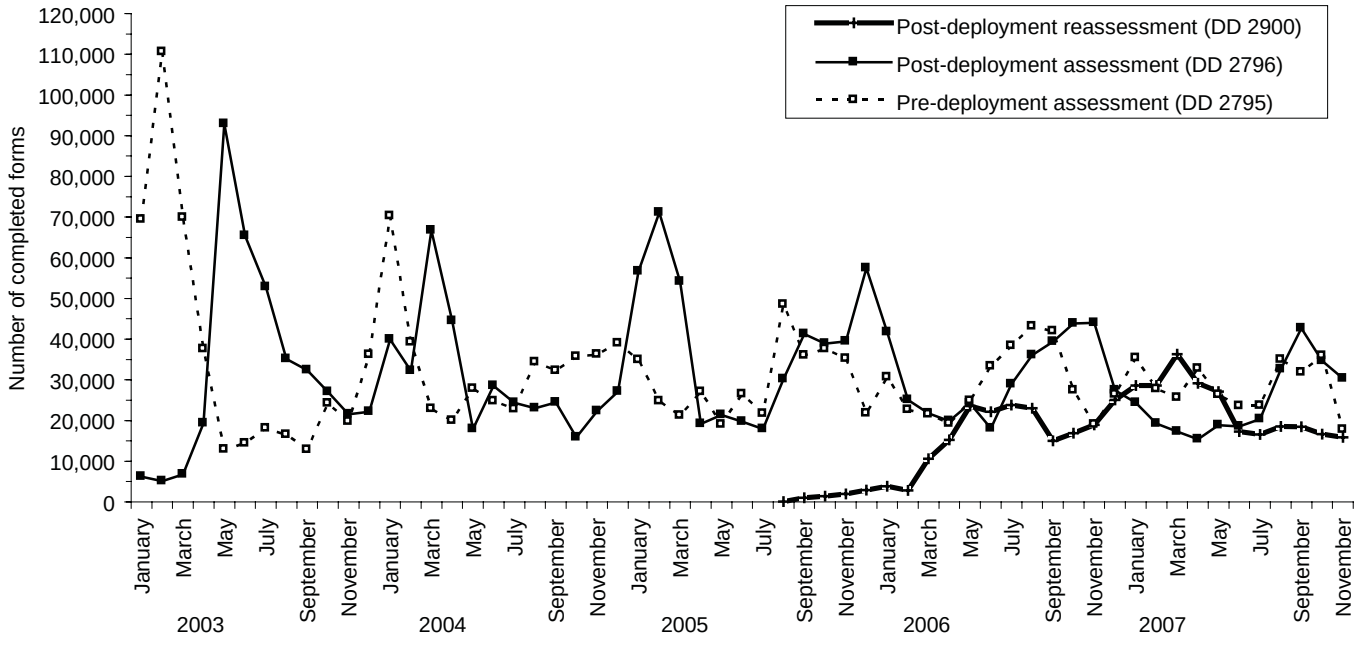


Table 1. Deployment-related health assessment forms, by month, U.S. Armed Forces, December 2006-November 2007

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
Total	**341,951**	**100**	**301,751**	**100**	**278,232**	**100**
2006						
December	26,399	7.7	27,424	9.1	25,051	9.0
2007						
January	35,331	10.3	24,324	8.1	28,603	10.3
February	27,735	8.1	19,257	6.4	28,591	10.3
March	25,635	7.5	17,324	5.7	36,321	13.1
April	32,794	9.6	15,383	5.1	29,177	10.5
May	26,291	7.7	18,841	6.2	27,084	9.7
June	23,573	6.9	18,573	6.2	17,324	6.2
July	23,641	6.9	20,357	6.7	16,589	6.0
August	34,956	10.2	32,582	10.8	18,554	6.7
September	31,848	9.3	42,694	14.1	18,457	6.6
October	35,952	10.5	34,626	11.5	16,642	6.0
November	17,796	5.2	30,366	10.1	15,839	5.7

deployers rated their health as "fair" or "poor"; however, 3-6 months after returning from deployment (during post-deployment reassessments), approximately one of seven (13.9%) respondents rated their health as "fair" or "poor" **(Figure 2).**

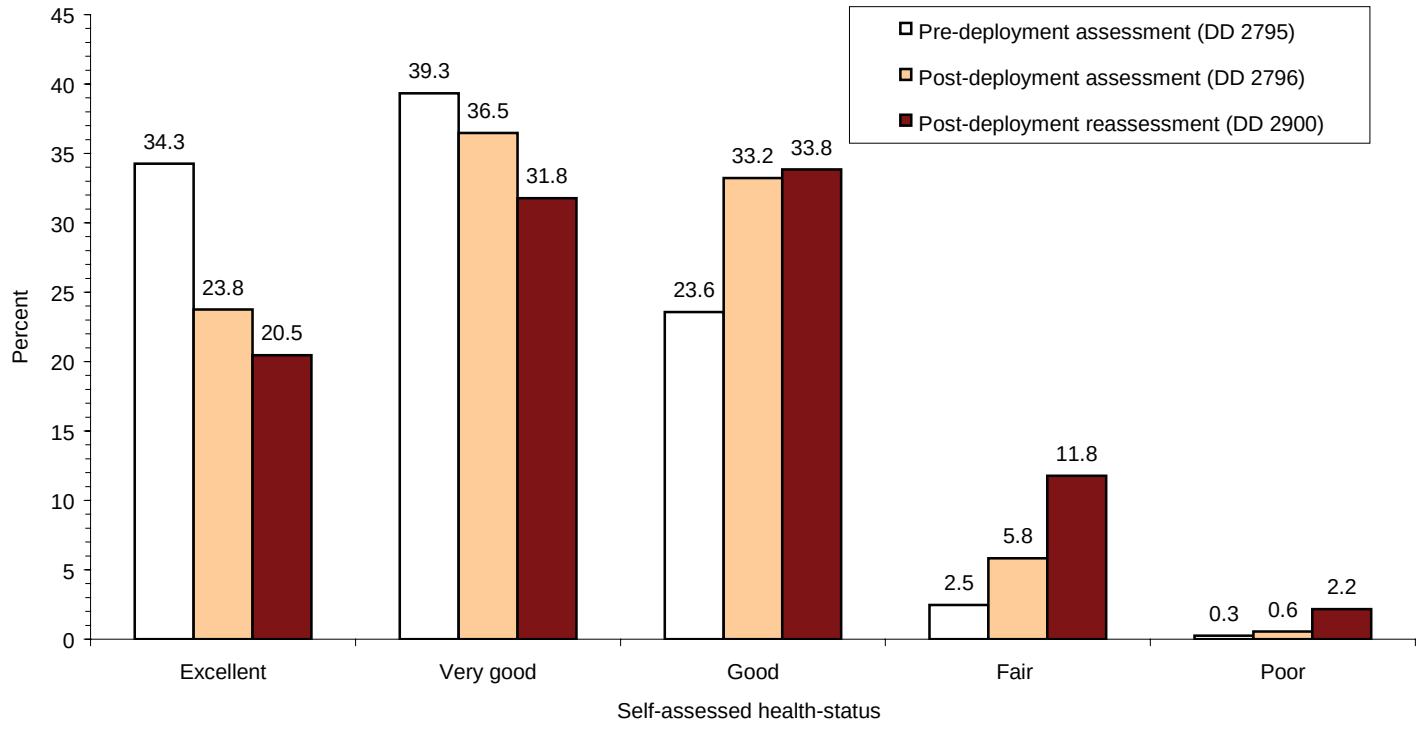
From January 2003 through November 2007, the proportion of deployers who assessed their general health as "fair" or "poor" before deploying remained consistently low (% "fair" or "poor" "health in general," pre-deployment health assessments, January 2003-November 2007, by month: mean: 2.4% [range: 1.5-3.4%]) **(Figure 3).** During the same period, the proportion of redeployers who assessed their general health as "fair" or "poor" around times of redeployment was consistently and clearly higher than before deploying (% "fair" or "poor" "health in general," post-deployment health assessments, January 2003-November 2007, by month: mean: 7.0% [range: 3.0-10.2%]) **(Figure 3).** Finally, from January 2006 through October 2007, the proportion of redeployers who assessed their general health as "fair" or "poor" 3-6 months after redeploying was sharply higher than at redeployment (% "fair" or "poor" "health in general," post-deployment health reassessments, January 2006-November 2007, by month: mean: 13.6% [range: 11.8-17.2%]) **(Figure 3).**

More than half of service members who rated their overall health before deployment chose a different descriptor after deploying, but usually by a single category (on a five category scale). The proportions of deployers whose self-rated health improved by more than one category from pre-deployment to reassessment remained relatively stable between December 2006 and November 2007 (mean: 1.4%, range:1.1-1.6%) **(Figure 4).** The proportions of service members whose self-assessed health declined by more than one category was relatively stable between December 2006 and March 2007, declined between March and September 2007, and increased in October 2007 (mean: 16.4, range 13.6-19.0%) **(Figure 4).**

In general, on post-deployment assessments and reassessments, members of Reserve components and members of the Army were much more likely than their respective counterparts to report mental health-related symptoms and health and exposure-related concerns – and in turn, to have indications for medical and mental health follow-ups ("referrals") **(Table 2).**

Among Reserve versus active component members, relative excesses of health-related concerns and provider-indicated

Figure 2. Percent distributions of self-assessed health status as reported on deployment health assesment forms, U.S. Armed Forces, December 2006-November 2007



referrals were much greater 3-6 months after redeployment (DD2900) than either before deploying (DD2795) or at redeployment (DD2796) **(Table 2, Figures 5,6).** For example, among both active and Reserve component members of all Services, mental or behavioral health referrals were more common after deployment than before **(Figure 5).** However, from the time of redeployment to 3-6 months later, mental health referrals sharply increased among active and Reserve component members of the Army, Navy, and Marine Corps (but not Air Force) **(Table 2, Figure 5).** Of note in this regard, the largest absolute increase in mental health referrals from redeployment to 3-6 months later was for Reserve component members of the Army (post-deployment: 4.8%; reassessment: 12.4%) **(Table 2, Figure 5).**

Finally, over the past three years, Reserve component members have been approximately twice as likely as active to report "exposure concerns" on post-deployment health assessments (DD2796) (%"exposure concerns," post-deployment assessments, by month, December 2004-November 2007: Reserve: mean: 26.1%, range: 19.3-33.7%; active: mean: 13.0%; range: 7.3-20.0%) **(Figures 6,7).** Sharply higher proportions of both Reserve and active component members endorsed exposure concerns 3-6 months after (DD2900) compared to around times (DD2796) of redeployment (%"exposure concerns," post-deployment reassessments, by month, January 2006-November 2007: Reserve: mean: 37.4%, range: 31.0-48.3%; active: mean: 19.2%; range: 16.7-23.6%) **(Figure 7).**

Editorial comment:

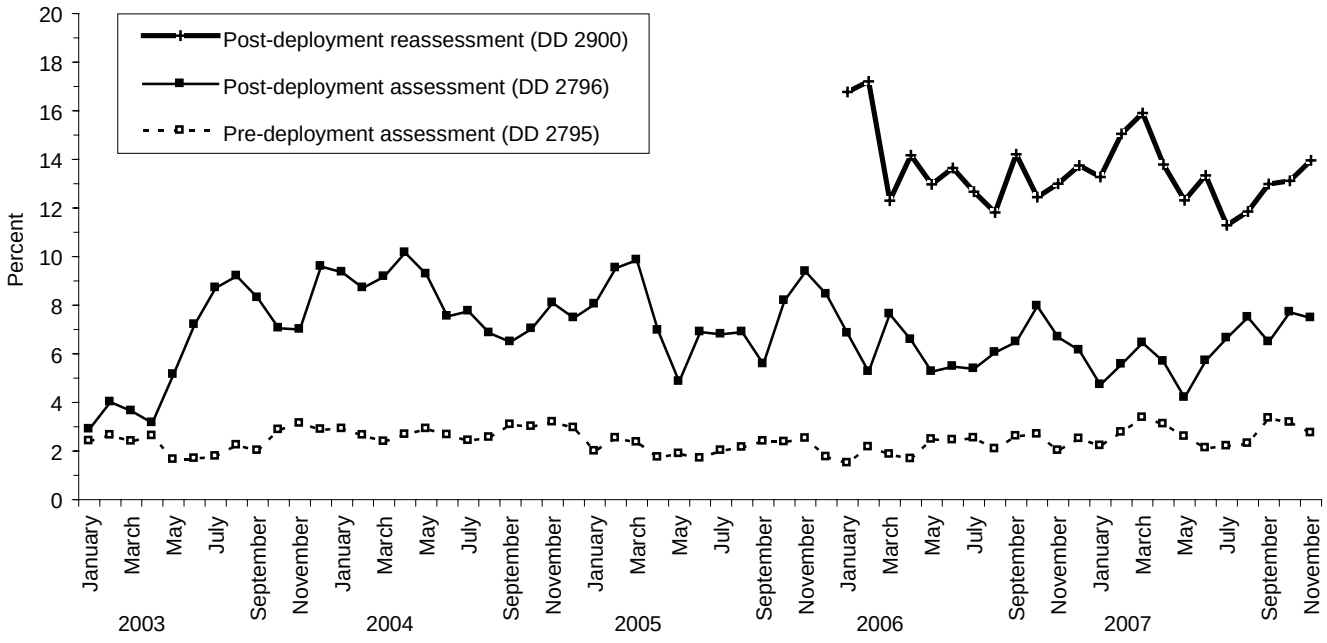
In general, since 2003, proportions of U.S. deployers to Iraq and Afghanistan who report medical or mental health-related symptoms (or have indications for medical or mental health referrals) on deployment-related health assessments increased from pre-deployment to post-deployment to 3-6 months post-deployment, are higher among members of the Army than the other Services, and are higher among Reserve than the active component members.

Regardless of the Service or component, deployers often rate their general health worse when they return compared to before deploying. This is not surprising because deployments are inherently physically and psychologically demanding. Clearly, there are many more – and more significant – threats to the physical and mental health of service members when they are conducting or supporting combat operations away from their families in hostile environments compared to when serving at their permanent duty stations (active component) or when living in their civilian communities (Reserve component).

However, many redeployed service members rate their general health worse 3-6 months after returning from deployment compared to earlier. This finding may be less intuitively understandable. Symptoms of post-traumatic stress disorder (PTSD) may emerge or worsen within several months after a life threatening experience (such as military service in a war zone). PTSD among U.S. veterans of combat duty in Iraq has been associated with higher rates of physical health problems after redeployment.[4] The post-deployment health reassessment at 3-6 months post-deployment is designed to detect service members with symptoms not only of PTSD but also persistent or emerging deployment-related medical and mental health problems.

Among British veterans of the Iraq war, Reservists reported

Figure 3. Proportion of deployment health assessment forms with self-assessed health status as "fair" or "poor", U.S. Armed Forces, January 2003-November 2007



more "ill health" than their active counterparts.[5] Roles, traumatic experiences, and unit cohesion while deployed were associated with medical outcomes after returning; however, PTSD symptoms were more associated with problems at home (e.g, reintegration into family, work, and other aspects of civilian life) than with events in Iraq.[5] The finding may explain, at least in part, the large differences in prevalences of mental health symptoms, medical complaints, and provider-indicated mental health referrals among Reserve compared to active members — particularly in the Army and Navy — 3-6 months after returning from deployment compared to earlier.

Post-deployment health assessments may be more reliable several months after redeployment compared to earlier. Commanders, supervisors, family members, peers, and providers of health care to redeployed service members should be alert to emerging or worsening symptoms of physical and psychological problems for several months, at least, after returning from deployment.

Figure 4. Proportion of service members whose self-assessed health status improved ("better") or declined ("worse") (by 2 or more categories on 5-category scale) from pre-deployment to reassessment, by month, U.S. Armed Forces, December 2006-November 2007

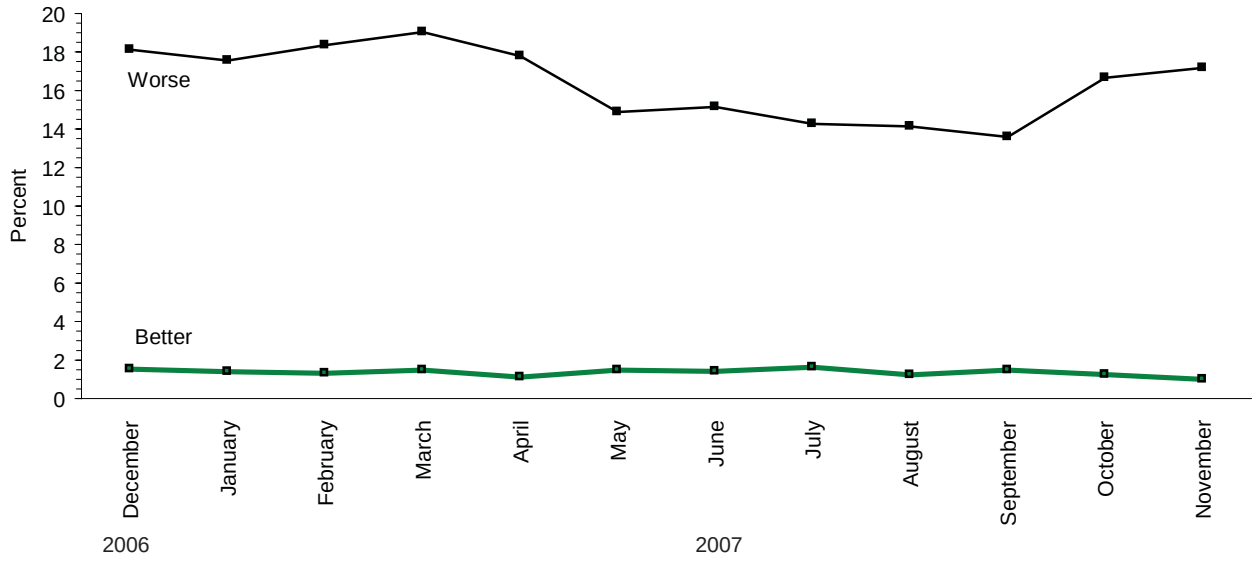


Figure 5. Percent of deployers with mental or behavioral health referrals, by Service and component, by timing of health assessment, U.S. Armed Forces, December 2006-November 2007

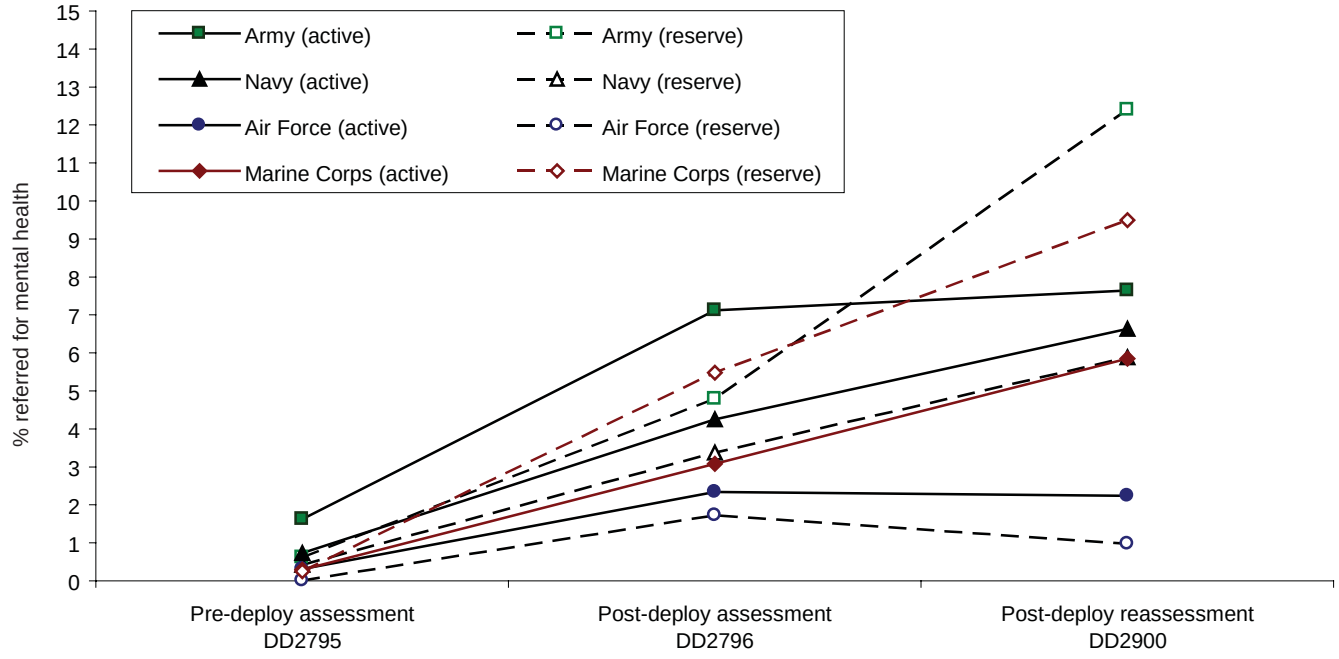


Table 2. Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, December 2006-November 2007

	Army			Navy			Air Force			Marine Corps			All service members		
Active component	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900
	n=151,956	n=116,622	n=91,765	n=16,588	n=11,113	n=7,284	n=64,680	n=57,662	n=55,235	n=31,825	n=33,557	n=22,015	n=265,049	n=218,954	n=176,299
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	4.5	8.1	18.1	1.7	3.7	6.8	0.5	2.1	5.2	1.8	3.1	9.9	3.1	5.5	12.5
Health concerns, not wound or injury	13.3	25.5	41.5	5.2	11.8	22.8	4.6	14.1	16.9	4.0	9.4	26.6	9.6	19.3	31.2
Health worse now than before deployed	na	22.1	28.5	na	10.1	15.6	na	7.8	10.6	na	12.0	19.6	na	16.2	21.3
Exposure concerns	na	21.5	25.6	na	11.3	13.9	na	6.3	13.0	na	7.3	17.3	na	14.8	20.2
PTSD symptoms (2 or more)	na	17.3	17.6	na	6.0	9.9	na	2.8	3.2	na	7.7	12.4	na	11.4	12.1
Depression symptoms	na	32.5	10.5	na	20.4	7.6	na	9.0	2.9	na	25.8	9.6	na	24.7	7.9
Referral indicated by provider (any)	7.7	29.7	25.0	6.8	22.1	21.0	1.6	12.9	8.7	3.5	16.2	20.4	5.6	22.8	19.2
Mental health referral indicated*	1.6	7.1	7.6	0.7	4.2	6.6	0.3	2.3	2.2	0.3	3.1	5.9	1.1	5.1	5.7
Medical visit following referral†	93.4	99.4	98.9	89.0	87.3	92.3	80.2	94.5	96.0	57.2	76.5	86.1	89.9	93.4	97.3
	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900
Reserve component	n=52,457	n=63,831	n=71,280	n=4,064	n=2,371	n=6,308	n=17,702	n=14,918	n=19,007	n=2,353	n=1,550	n=5,338	n=76,576	n=82,670	n=101,933
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	2.0	10.3	19.1	0.8	5.6	9.6	0.3	2.1	4.4	2.1	4.6	12.7	1.6	8.6	15.4
Health concerns, not wound or injury	15.3	37.8	57.4	3.5	27.3	41.1	1.8	22.7	18.0	4.0	20.5	45.1	11.2	34.5	48.4
Health worse now than before deployed	na	29.2	38.1	na	19.1	24.9	na	11.0	10.6	na	23.5	27.5	na	25.5	31.6
Exposure concerns	na	32.7	40.5	na	29.7	30.0	na	9.4	18.4	na	18.8	29.1	na	28.1	35.2
PTSD symptoms (2 or more)	na	14.2	23.9	na	7.0	13.0	na	2.1	3.4	na	11.8	20.9	na	11.8	19.2
Depression symptoms	na	28.1	12.5	na	21.0	8.3	na	8.0	2.6	na	35.2	9.7	na	24.4	10.3
Referral indicated by provider (any)	10.6	30.2	49.6	5.6	25.3	34.1	0.2	11.9	26.0	4.1	26.6	50.7	7.8	26.7	44.3
Mental health referral indicated*	0.6	4.8	12.4	0.4	3.4	5.9	0.0	1.7	1.0	0.3	5.5	9.5	0.5	4.2	9.7
Medical visit following referral†	99.0	98.5	29.2	98.9	94.7	30.6	31.3	58.5	24.7	27.3	60.4	21.6	98.4	91.0	28.2

*Includes behavioral health, combat stress and substance abuse referrals
†Record of inpatient or outpatient visit within 6 months after referral

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Figure 6. Ratio of percents of deployers who endorse selected questions, Reserve versus active component, on pre-deployment health assessments (DD2795) and post-deployment health reassessments (DD2900), U.S. Armed Forces, December 2006-November 2007

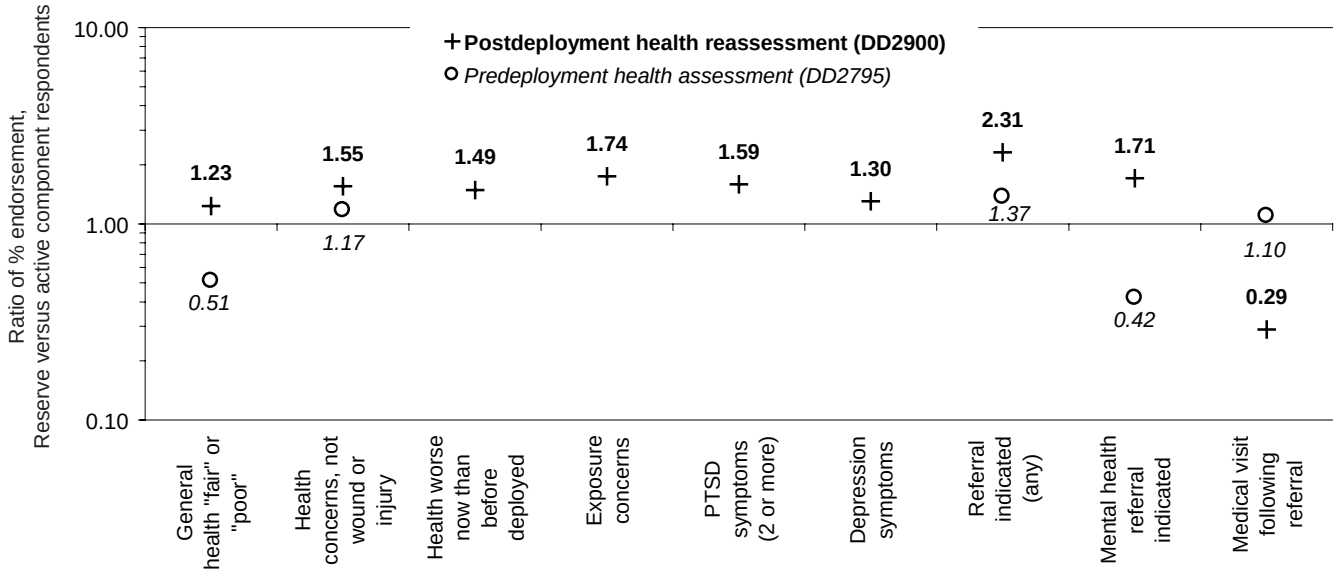
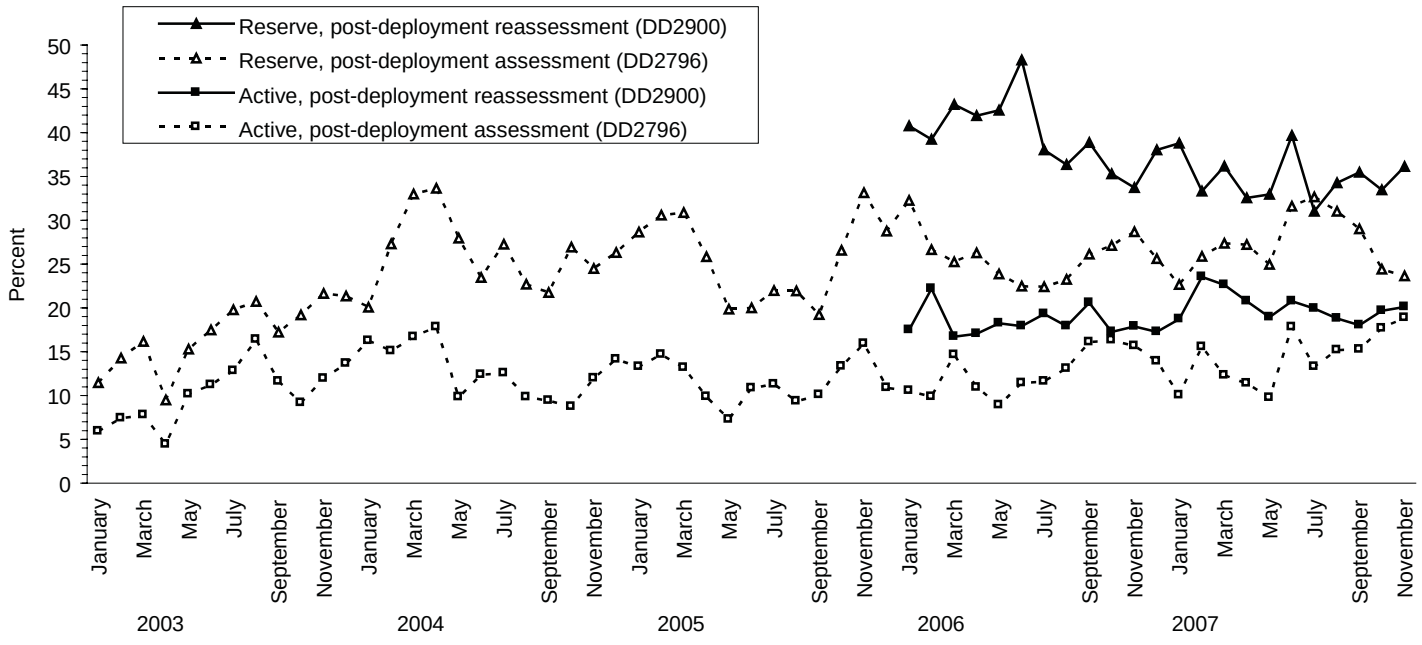
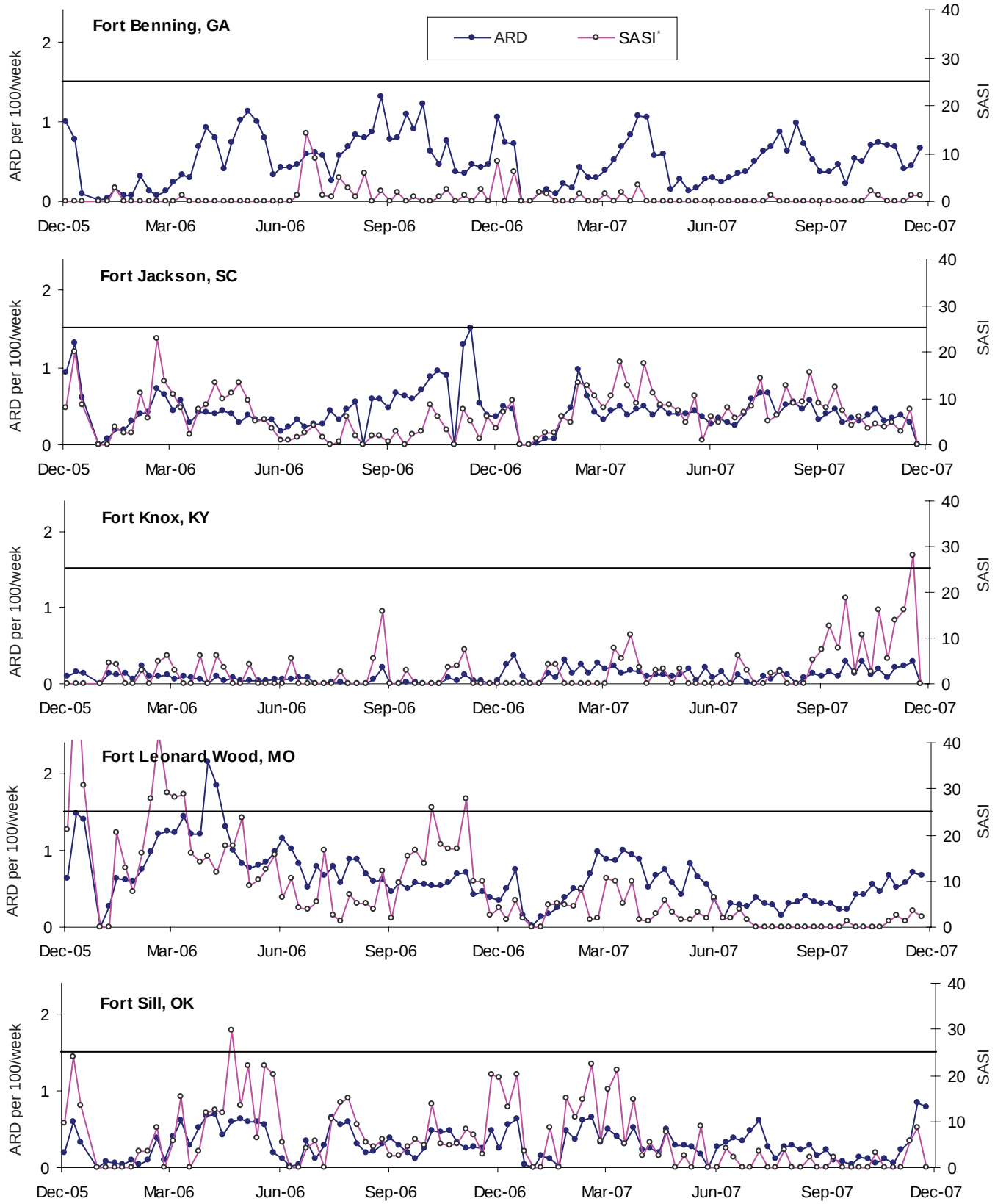


Figure 7. Proportion of service members who endorse exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2003-November 2007



Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI*), basic combat training centers, U.S. Army, by week, December 2005-December 2007



* Streptococcal-ARD surveillance index (SASI) = ARD rate x % positive culture for group A streptococcus
ARD rate = cases per 100 trainees per week
ARD rate ≥ 1.5 or SASI ≥ 25.0 for 2 consecutive weeks are surveillance indicators of epidemics

Sentinel reportable events for service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers,* January-November 2006 and January-November 2007

Air Force

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Air Combat Cmd	673	1,331	1	2	.	4	2	8	.	.	.	.	1	6	2	7
Air Education & Training Cmd	296	661	.	1	1	1	7	15	.	14	.	.	1	4	3	10
Lackland, TX	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	83	42	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Air Force Dist. of Washington	43	26	.	.	.	.	.	.	.	1	.	.	.	1	.	.
Air Force Materiel Cmd	324	500	1	.	1	2	2	19	.	2	.	.	2	.	2	2
Air Force Special Ops Cmd	75	167	.	.	.	.	5	3	5	1	.	.	.	.	.	.
Air Force Space Cmd	209	275	.	2	.	1	3	7	.	1	.	.	1	2	.	1
Air Mobility Cmd	456	660	.	1	3	1	5	12	8	2	.	.	4	4	1	3
Pacific Air Forces	319	468	.	1	1	2	5	4	.	1	.	.	2	5	.	10
PACAF Korea	112	70	.	.	.	.	.	.	.	.	.	.	.	.	.	1
U.S. Air Forces in Europe	205	251	.	3	1	.	.	.	.	1	.	.	.	1	2	.
Total	**2,795**	**4,451**	**2**	**10**	**7**	**11**	**29**	**70**	**13**	**23**	**0**	**0**	**11**	**23**	**10**	**34**

*Events reported by December 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Air Combat Cmd	1	11	.	.	601	891	40	80	3	6	.	3	3	.	1	6
Air Education & Training Cmd	.	2	1	.	217	509	32	74	1	.	.	.	.	1	.	1
Lackland, TX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	.	.	1	.	38	35	.	3	.	.	.	.	2	.	1	.
Air Force Dist. of Washington	.	.	.	.	33	23	4	1	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	.	5	1	1	217	401	43	49	1	1	.	.	.	.	.	.
Air Force Special Ops Cmd	.	.	.	.	49	131	14	20	.	.	.	.	.	.	.	12
Air Force Space Cmd	1	2	.	.	166	236	6	15	.	1	.	.	1	.	.	.
Air Mobility Cmd	6	7	1	.	342	551	18	47	1	1	.	.	.	.	.	3
Pacific Air Forces	.	2	2	1	274	392	21	27	.	.	.	.	2	.	.	.
PACAF Korea	.	.	.	.	92	57	12	2	.	2	.	.	.	.	.	.
U.S. Air Forces in Europe	2	2	1	.	135	201	15	14	1	.	.	.	.	.	.	.
Total	**10**	**31**	**7**	**2**	**2,164**	**3,427**	**205**	**332**	**7**	**11**	**0**	**3**	**8**	**1**	**2**	**22**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers,* January-November 2006 and January-November 2007

Army

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NORTH ATLANTIC																
Washington, DC Area	252	267	4	1	3	4	3	7	.	1	.	.	1	6	.	1
Aberdeen, MD	11	19	.	.	.	1	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	323	231	11	8	1	2	9	8	2	4	.	.	.	.	5	1
FT Bragg, NC	1,630	1,266	12	2	.	.	32	20	.	2	.	.	.	.	.	.
FT Drum, NY	209	208	.	.	.	.	.	.	.	.	.	.	.	2	.	.
FT Eustis, VA	225	189	.	.	.	.	.	1	.	.	.	.	.	.	.	.
FT Knox, KY	278	263	.	4	2	.	.	2	2	2	.	.	.	2	.	.
FT Lee, VA	341	351	.	.	.	1	.	1	.	1	.	.	.	3	4	1
FT Meade, MD	105	86	.	.	.	.	2	1	.	.	.	.	1	.	.	.
West Point, NY	55	45	.	.	.	.	1	.	.	.	.	.	3	3	.	.
GREAT PLAINS																
FT Sam Houston, TX	503	521	.	1	2	2	12	8	2	1	.	.	2	4	1	7
FT Bliss, TX	315	206	.	.	1	.	2	.	1	.	.	.	5	2	.	.
FT Carson, CO	785	620	1	3	3	5	5	1	.	1	.	.	.	.	.	.
FT Hood, TX	1,603	2,048	6	15	3	3	12	16	13	9	.	.	.	.	1	1
FT Huachuca, AZ	92	94	.	1	.	.	11	6	.	.	.	.	.	.	.	.
FT Leavenworth, KS	54	49	.	1	4	.	.	.	.	2	.	.	.	.	.	.
FT Leonard Wood, MO	307	346	.	.	5	1	2	1	.	1	.	.	.	.	6	11
FT Polk, LA	221	234	2	.	1	3	1	5	.	.	.	.	.	.	.	1
FT Riley, KS	236	326	2	2	.	.	.	5	.	.	.	.	.	.	.	2
FT Sill, OK	222	177	.	.	.	.	1	2	.	.	.	.	.	.	2	1
SOUTHEAST																
FT Gordon, GA	436	663	.	.	.	.	.	6	.	3	.	.	11	1	1	.
FT Benning, GA	448	405	3	1	1	1	12	6	2	6	.	.	.	1	.	1
FT Campbell, KY	685	748	1	1	.	.	1	.	.	9	.	.	.	.	.	.
FT Jackson, SC	262	308	.	.	.	.	.	2	.	.	.	.	1	1	1	.
FT Rucker, AL	81	87	1	1	.	.	5	1	.	13	.	.	.	2	.	.
FT Stewart, GA	945	963	.	2	.	.	8	27	18	10	.	.	11	3	3	2
WESTERN																
FT Lewis, WA	563	759	.	3	.	5	5	3	.	1	.	.	1	.	1	1
FT Irwin, CA	103	101	1	1	.	.	.	2	1	1	.	.	.	.	.	.
FT Wainwright, AK	188	234	.	.	.	.	3	1	.	.	.	.	.	.	1	.
OTHER LOCATIONS																
Hawaii	902	772	38	24	1	2	11	17	2	.	.	.	.	1	2	.
Germany	896	836	12	6	2	1	23	8	.	13	.	.	2	.	1	1
Korea	608	591	.	.	.	.	.	.	.	.	.	.	3	.	5	2
Total	**13,884**	**14,013**	**94**	**77**	**29**	**31**	**161**	**157**	**43**	**80**	**0**	**0**	**41**	**31**	**34**	**33**

*Events reported by December 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers,* January-November 2006 and January-November 2007

Army

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NORTH ATLANTIC																
Washington, DC Area	3	13	2	5	146	147	23	22	3	8	1	.	.	.	.	.
Aberdeen, MD	.	.	.	.	8	10	1	3	.	.	.	.	.	.	.	.
FT Belvoir, VA	2	1	.	1	184	166	41	22	.	2	.	.	.	.	.	.
FT Bragg, NC	2	1	21	4	1,121	864	169	157	4	2	124	77	2	1	135	132
FT Drum, NY	.	2	.	2	186	145	22	26	.	.	.	.	.	.	.	.
FT Eustis, VA	.	1	.	.	150	150	47	13	.	.	.	.	.	.	19	10
FT Knox, KY	6	1	2	1	194	207	44	34	2	.	.	.	4	.	11	2
FT Lee, VA	.	3	.	.	264	267	43	38	.	3	.	.	.	1	3	17
FT Meade, MD	.	1	.	.	87	70	13	9	.	1	1	1	.	1	.	.
West Point, NY	16	23	.	.	25	14	.	.	.	.	.	.	1	.	2	.
GREAT PLAINS																
FT Sam Houston, TX	.	1	1	.	287	278	54	58	5	3	.	.	.	.	9	6
FT Bliss, TX	.	1	.	.	233	154	55	35	5	1	.	.	.	.	1	.
FT Carson, CO	.	.	.	1	568	445	92	63	.	1	39	12	1	1	.	.
FT Hood, TX	.	2	1	5	1,080	1,488	249	289	.	2	40	102	.	.	32	27
FT Huachuca, AZ	.	.	.	.	71	68	9	18	.	1	.	.	1	.	.	.
FT Leavenworth, KS	.	1	.	.	44	40	6	5	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	.	1	.	1	217	238	19	34	.	1	.	.	.	2	15	20
FT Polk, LA	.	.	.	15	122	123	35	39	2	1	.	.	.	.	58	43
FT Riley, KS	.	.	.	.	188	241	33	21	.	.	.	.	1	.	10	20
FT Sill, OK	.	.	.	1	71	100	25	23	2	2	.	.	.	1	58	34
SOUTHEAST																
FT Gordon, GA	.	1	.	.	314	480	71	98	.	4	3	.	.	.	4	6
FT Benning, GA	.	.	1	2	265	252	78	70	.	1	.	.	.	1	76	45
FT Campbell, KY	.	.	.	.	503	573	67	87	.	.	.	.	.	.	33	15
FT Jackson, SC	.	.	.	.	216	170	39	43	.	3	.	.	.	.	.	87
FT Rucker, AL	.	.	.	.	58	58	5	3	1	1	.	.	.	.	10	5
FT Stewart, GA	3	1	4	.	597	678	161	126	2	3	18	.	1	.	95	63
WESTERN																
FT Lewis, WA	.	.	10	3	441	644	68	83	1	.	25	9	.	.	.	.
FT Irwin, CA	.	1	.	1	75	68	11	5	3	.	.	.	.	.	10	18
FT Wainwright, AK	.	.	17	.	116	178	14	13	.	.	.	.	27	18	.	.
OTHER LOCATIONS																
Hawaii	.	1	6	.	643	593	78	64	.	.	.	.	.	.	35	3
Germany	34	28	14	14	572	489	175	168	4	2	1	3	1	.	5	45
Korea	.	.	17	13	484	484	74	61	3	1	.	1	2	20	12	9
Total	**66**	**84**	**96**	**69**	**9,530**	**9,882**	**1,821**	**1,730**	**37**	**43**	**252**	**205**	**41**	**46**	**633**	**607**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers,* January-November 2006 and January-November 2007

Navy

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NATIONAL CAPITOL AREA																
Annapolis, MD	33	0	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Bethesda, MD	88	35	5	1	7	.	3	2	2	.	.	.	.	1	.	.
Patuxent River, MD	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	7	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	13	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Beaufort, SC	96	251	.	.	.	.	2	.	.	1	.	.	.	.	.	.
Camp Lejeune, NC	567	305	1	.	.	.	24	7	1	.	.	.	.	.	1	.
Cherry Point, NC	125	115	.	.	1	.	4	2	1	.	.	.	.	.	.	3
Great Lakes, IL	0	170	.	.	.	1	.	3	.	.	.	.	.	.	.	.
Jacksonville, FL	195	199	.	1	.	.	10	10	1	4	.	.	1	.	.	.
Mayport, FL	33	23	.	1	.	.	4	4	.	.	.	.	.	.	.	.
NABLC Norfolk, VA	55	60	.	.	1	.	1	.	.	.	.	.	.	.	.	.
NBMC Norfolk, VA	200	361	.	.	.	.	.	.	.	.	.	.	1	.	.	.
NEHC Norfolk, VA	2	4	.	.	.	.	.	.	.	.	.	.	.	.	.	2
North Charleston, SC	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pensacola, FL	82	80	.	.	.	2	3	4	.	3	.	.	.	.	.	5
Portsmouth, VA	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	1	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Guantanamo Bay, Cuba	0	4	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Europe	31	22	9	.	1	.	1	.	1	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	44	12	.	.	.	.	3	1	.	.	.	.	2	.	.	.
Corpus Christi, TX	1	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fallon, NV	3	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	5	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	66	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	10	0	3	.	.	.	.	.	.	.	.	.	.	.	.	.
San Diego, CA	99	313	.	3	2	2	8	3	1	2	.	.	8	28	.	.
Guam	82	31	4	.	.	.	6	1	.	.	.	.	.	.	.	.
Japan	109	81	.	.	.	.	3	.	.	.	.	.	.	.	.	1
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	93	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	44	29	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Total	**2,089**	**2,125**	**22**	**6**	**13**	**5**	**72**	**38**	**7**	**10**	**0**	**0**	**12**	**29**	**1**	**12**

*Events reported by December 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers,* January-November 2006 and January-November 2007

Navy

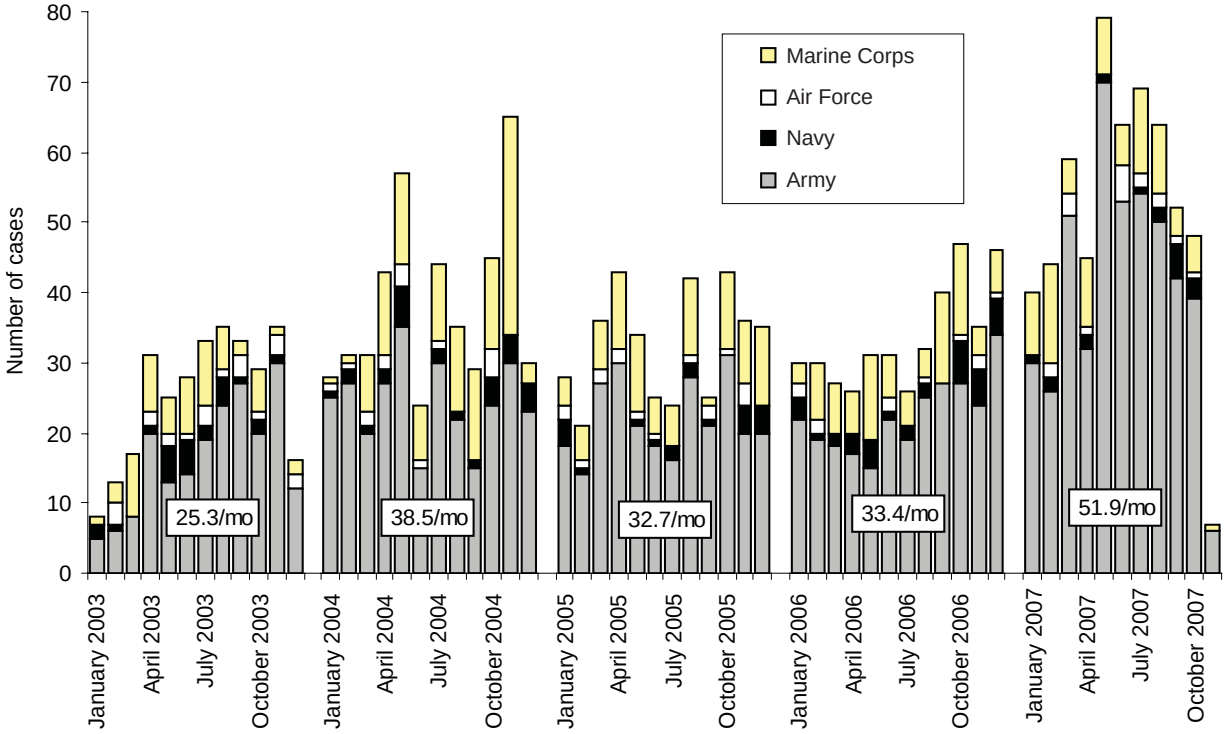
Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NATIONAL CAPITOL AREA																
Annapolis, MD	.	.	.	.	27	.	4	.	.	.	.	.	.	.	.	.
Bethesda, MD	3	4	.	.	44	20	4	2	.	1	.	.	.	.	.	.
Patuxent River, MD	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	.	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	.	.	.	.	8	1	5	1	.	1	.	.	.	.	.	.
Beaufort, SC	.	.	.	.	37	166	.	18	.	2	.	.	.	.	56	57
Camp Lejeune, NC	2	12	1	1	416	235	85	30	.	.	.	.	.	.	29	17
Cherry Point, NC	1	.	.	.	104	92	7	8	.	1	.	.	.	.	6	3
Great Lakes, IL	.	.	.	.	.	143	.	16	.	.	.	.	.	.	.	.
Jacksonville, FL	.	.	.	.	124	137	13	21	3	2	.	.	.	.	6	8
Mayport, FL	.	.	.	.	27	15	2	.	.	1	.	.	.	.	.	.
NABLC Norfolk, VA	.	.	.	.	43	52	9	8	.	.	.	.	.	.	1	.
NBMC Norfolk, VA	.	1	.	.	160	297	33	61	1	.	.	.	.	.	.	.
NEHC Norfolk, VA	.	.	.	.	.	2	.	.	.	.	.	.	1	.	1	.
North Charleston, SC	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.
Pensacola, FL	.	.	.	.	74	46	1	5	.	.	.	.	.	.	2	12
Portsmouth, VA	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	.	.	.	.	1	5	.	.	.	1	.	.	.	.	.	.
Guantanamo Bay, Cuba	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.
Europe	.	.	1	.	15	21	1	1	.	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	.	.	.	.	38	9	1	1	.	1	.	.	.	.	.	.
Corpus Christi, TX	.	.	.	.	1	3	.	1	.	.	.	.	.	.	.	.
Fallon, NV	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	.	.	.	.	4	3	.	.	1	.	.	.	.	.	.	.
Lemoore, CA	.	.	.	.	24	.	4	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	.	.	.	.	4	.	1	.	.	.	.	.	.	.	.	.
San Diego, CA	.	1	1	.	57	197	9	35	2	5	.	.	.	.	.	.
Guam	.	.	1	.	59	25	9	4	.	.	.	.	.	.	1	.
Japan	.	.	.	.	96	57	9	10	.	.	.	.	.	.	1	9
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	2	.	.	.	71	9	18	2	2	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	.	.	.	.	6	18	35	9	.	.	3	.	.	.	.	1
Total	**8**	**18**	**4**	**1**	**1,455**	**1,559**	**250**	**233**	**9**	**15**	**3**	**0**	**1**	**0**	**103**	**107**

‡Primary and secondary.

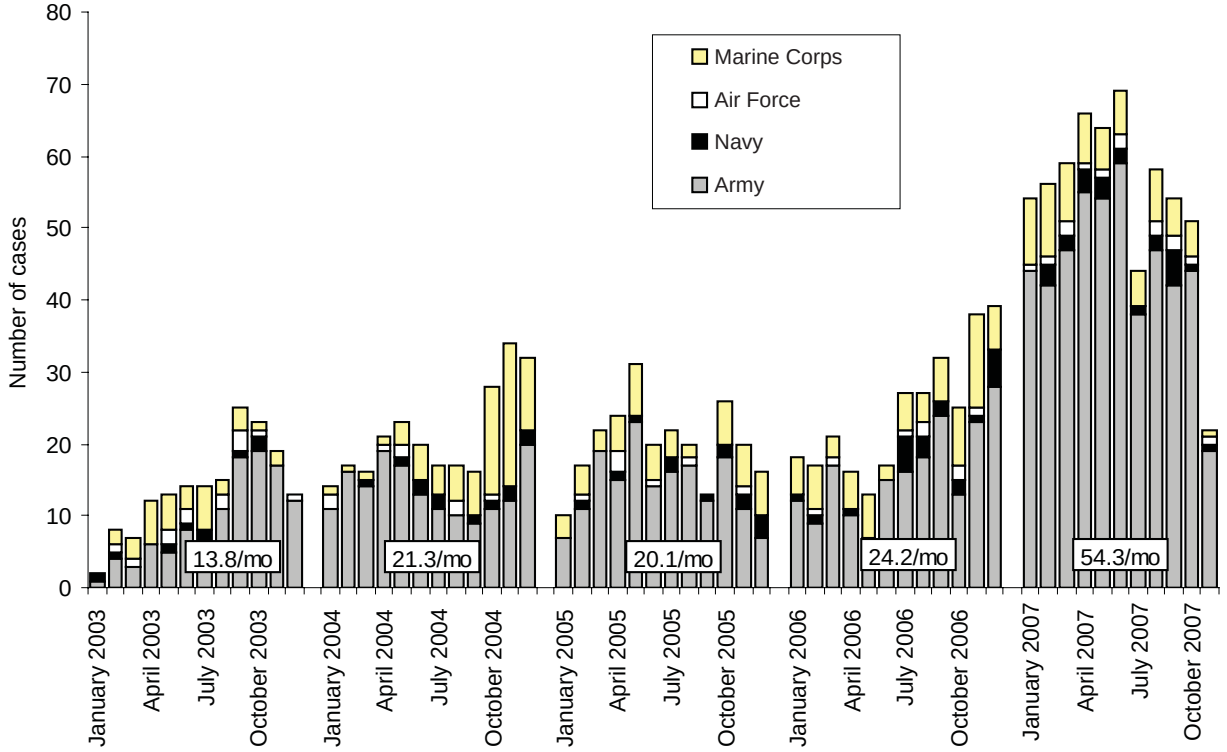
§Urethritis, non-gonococcal (NGU).

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-November 2007

Traumatic brain injury, hospitalizations (ICD-9: 800-804, 850-854, 959.01)*



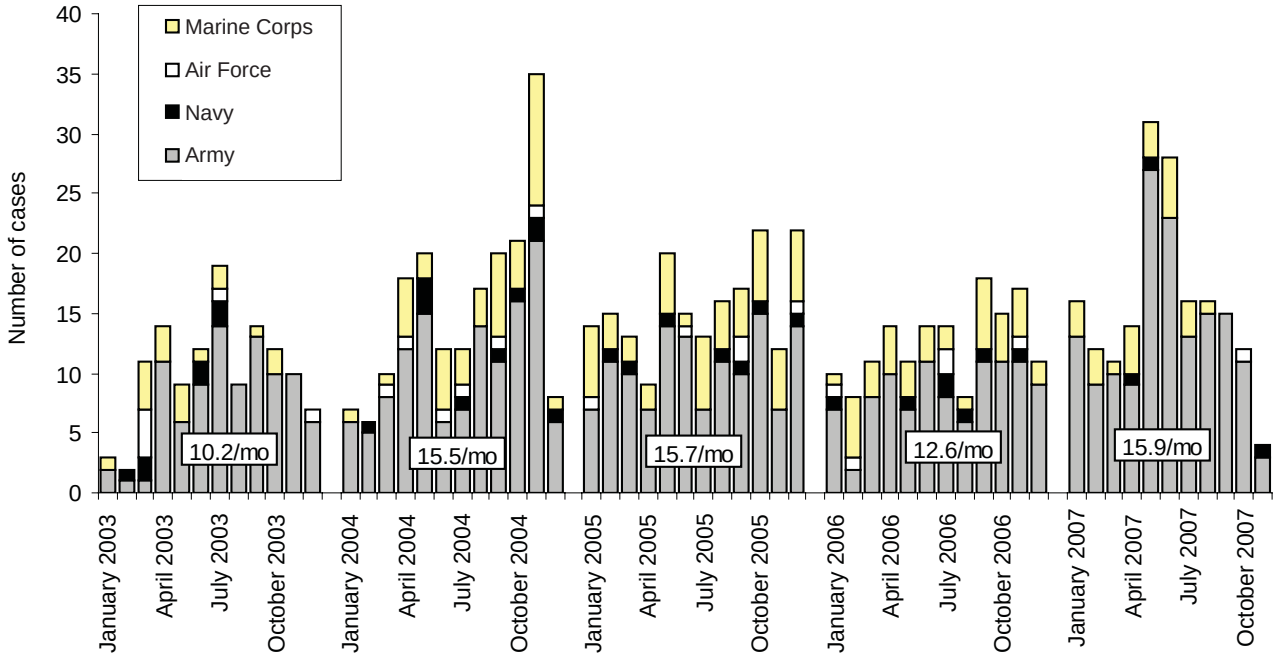
Traumatic brain injury, multiple ambulatory visits (without hospitalization), (ICD-9: 800-804, 850-854, 959.01)†



Reference: Army Medical Surveillance Activity. Traumatic brain injury among members of active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):2-6.
*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.
†Two or more ambulatory visits at least 7 days apart while deployed to/within 365 days of returning from OEF/OIF.

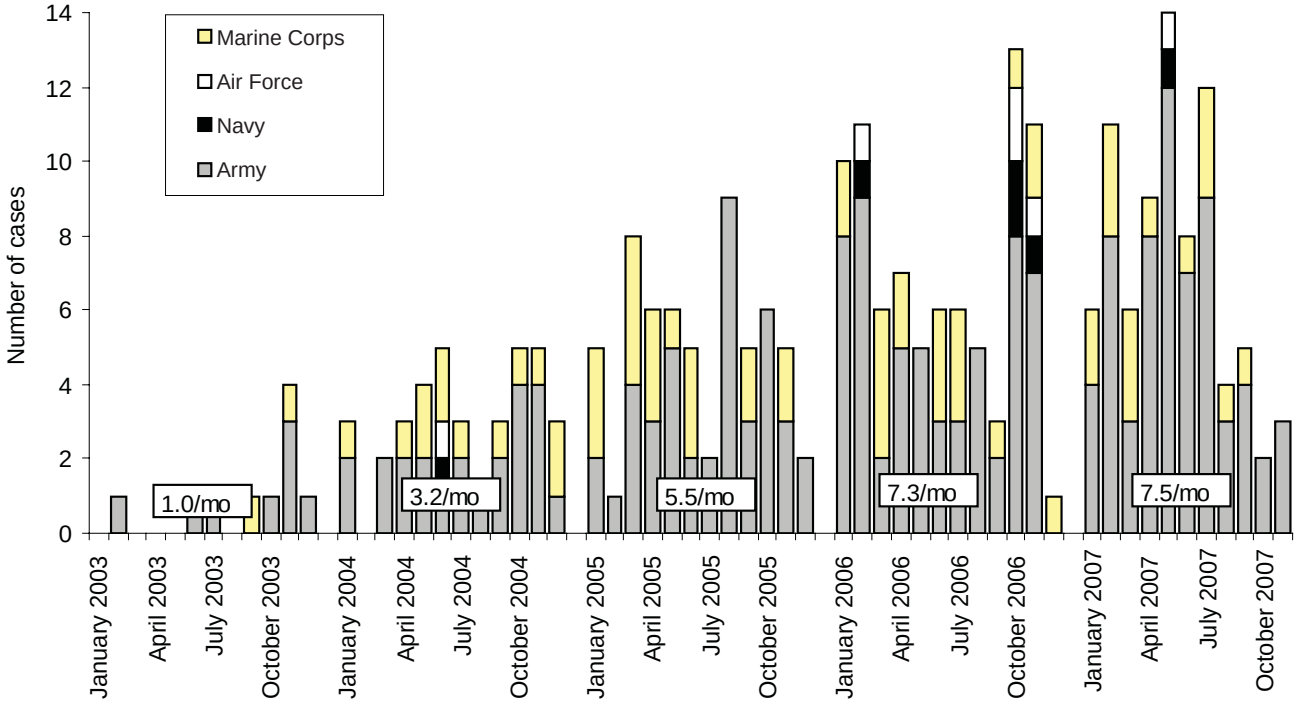
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-November 2007

Amputations (ICD-9: 887, 896, 897, V49.6 to V49.7, PR 84.0 to PR 84.1)*



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. *MSMR*. Jan 2005;11(1):2-6.
*Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 365 days of returning from OEF/OIF.

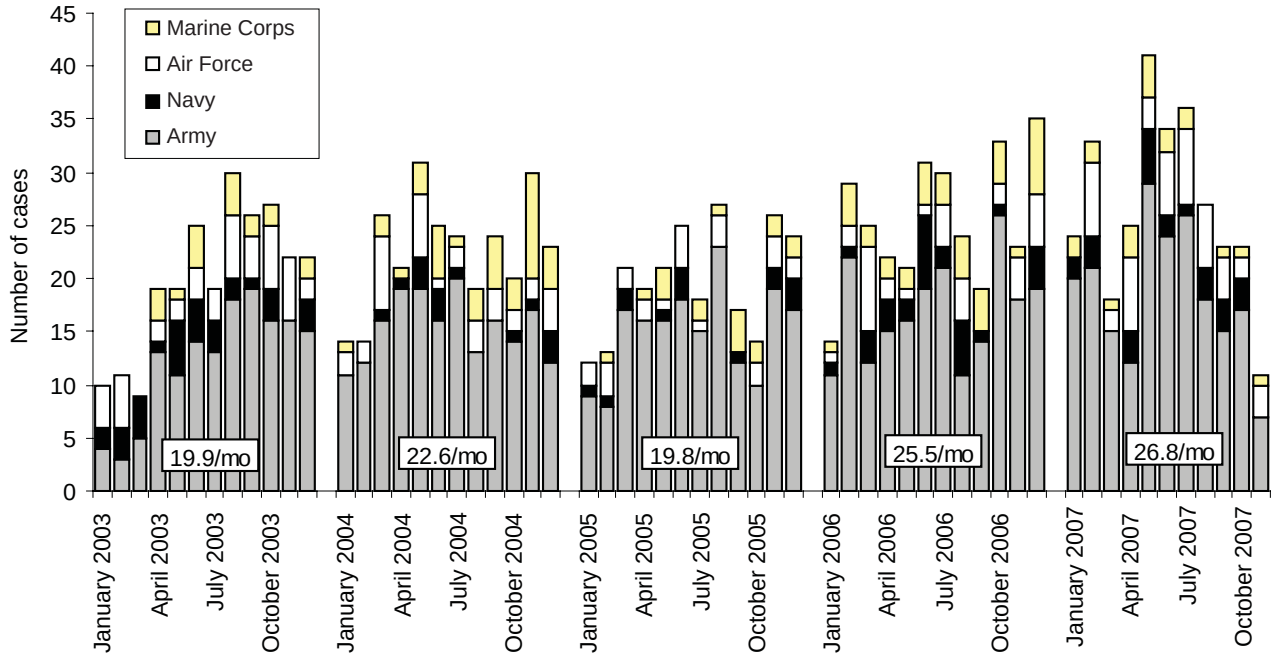
Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)†



Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.
†One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart while deployed to/within 365 days of returning from OEF/OIF.

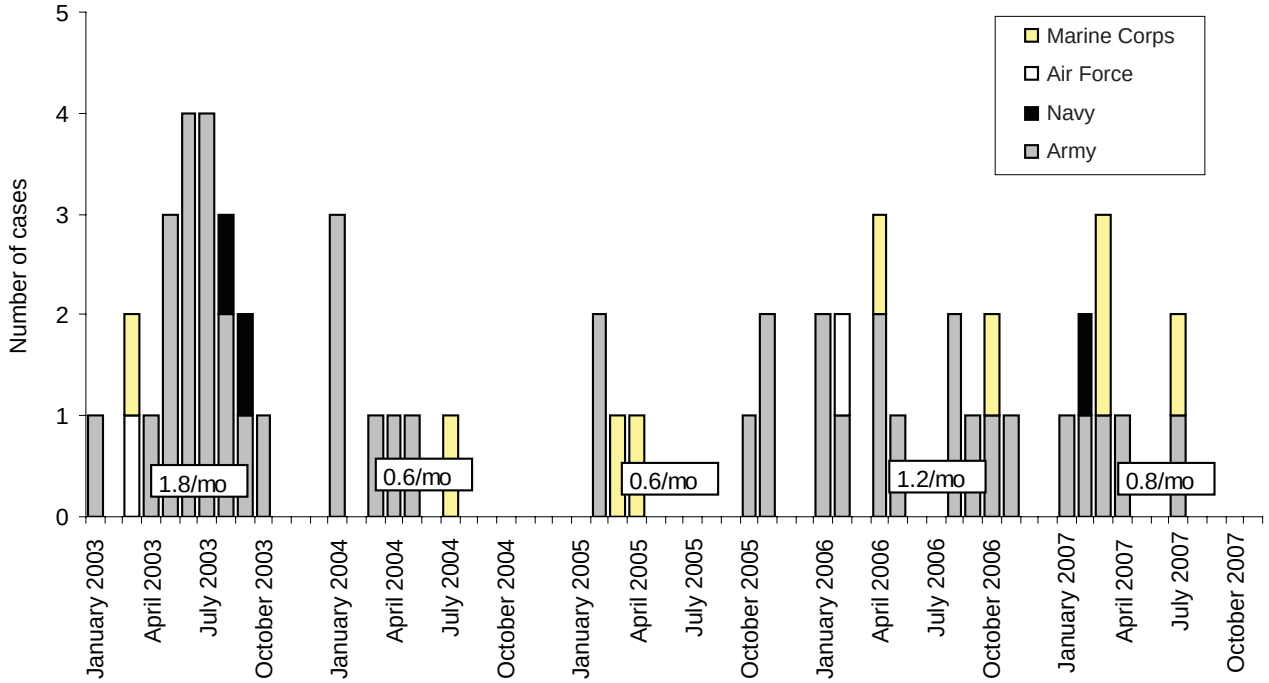
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-November 2007

Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 to 453.42 and 453.8)*



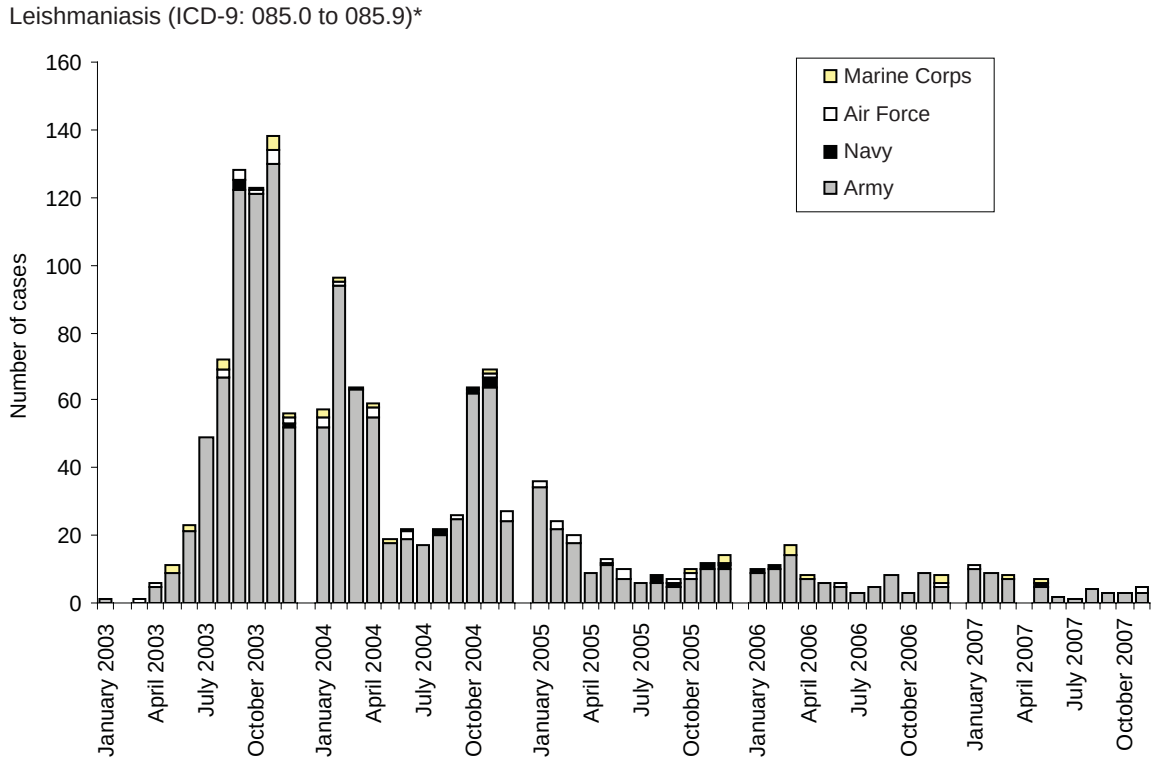
Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*.2006;117(4):379-83.
*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 90 days of returning from OEF/OIF.

Severe acute pneumonia (ICD-9: 518.81, 518.82, 518.3, 480-487, 786.09)†



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):6-7.
†Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-November 2007



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: leishmaniasis. Leishmaniasis among U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):2-4.
*Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.

SPECIAL NOTICE TO READERS:

Recent improvements in data summary procedures have increased the numbers of deployments that can be associated with Operation Enduring Freedom (OEF) or Operation Iraqi Freedom (OIF). In turn, summaries of medical events of surveillance interest among OEF/OIF participants may vary from comparable summaries in previous issues of the *MSMR*.

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